

URGENT MATTERS:

## IMPROVING SAFETY IN MASSACHUSETTS EMERGENCY DEPARTMENTS

A BETSY LEHMAN CENTER EXPERT PANEL REPORT



**BETSY  
LEHMAN  
CENTER**  
for Patient Safety

**AUGUST 2019**

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## EXECUTIVE SUMMARY

AUGUST 2019

## AN EXPERT PANEL REPORT

Safety risks exist in all medical care settings, but emergency medicine professionals face particular challenges as they strive to deliver the safest, highest quality care to their patients.

Massachusetts emergency departments rank high in a national review of ED quality and safety. Yet many frontline staff express concerns that the environment is not as safe as it needs to be for patients or staff.

In response to these concerns from their members, leaders of the Massachusetts College of Emergency Physicians (MACEP) reached out to the Betsy Lehman Center to help facilitate work to improve safety in emergency departments across the state. The Massachusetts Emergency Nurses Association (MENA) and the Massachusetts Association of Physician Assistants (MAPA) joined as partners in the effort.

Through this collaboration, the Betsy Lehman Center convened an expert panel to identify key risks to safety in emergency departments, recommend practical steps for mitigating these risks, and develop a toolkit to support implementation of the recommendations.

Recognizing the broad range of safety issues facing emergency medicine clinicians and staff, the expert panel focused on interventions that could be executed from “within the four walls” of the emergency department in three key areas: (1) **crowding**; (2) **cognitive overload**; and (3) **care coordination**.

## CHALLENGES TO SAFETY IN EMERGENCY MEDICINE

Almost 20 percent of adults in the United States visit an Emergency Department (ED) at least once a year, accounting for 145 million visits in 2016. By some estimates, nearly half (47.7 percent) of all hospital-based medical care is delivered in the ED and half of inpatient admissions come through the ED.

In Massachusetts:

- There were 3,144,308 patients visits to the emergency department in the most recent year for which data are available.
- Average volume of patient visits to EDs in the state ranges from under 50 patient visits per day in small community hospitals to over 300 per day in large, urban hospitals.
- The total number of visits to the emergency department per 1,000 residents declined by 6 percent between 2012 and 2017.
- Complexity of patients being seen in the ED is on the rise. For example, visits by patients with behavioral health conditions, increased 14 percent from 2012 to 2017.
- 23 percent of all medical visits to the ED in Massachusetts in 2016 resulted in an inpatient admission, long observation stay, or transfer.

A key challenge and risk to patient safety is crowding in EDs. Over 90 percent of EDs in the United States report that they experience routinely crowded conditions, and Massachusetts EDs are no exception. The primary driver of crowding is a lack of inpatient and outpatient capacity – there are too few inpatient beds to admit patients from the ED, and too few outpatient resources to meet the needs of lower acuity patients.

Crowding, in turn, impacts quality of care and patient outcomes, sometimes in profound ways. Patients in crowded EDs wait longer to be seen and are at heightened risk of leaving without treatment or having their condition worsen. Crowding has even been tied to costly downstream effects, such as increased inpatient length of stay and risk of death. It also contributes to stress, compassion-fatigue and burnout among ED staff and raises the risk of workplace violence.

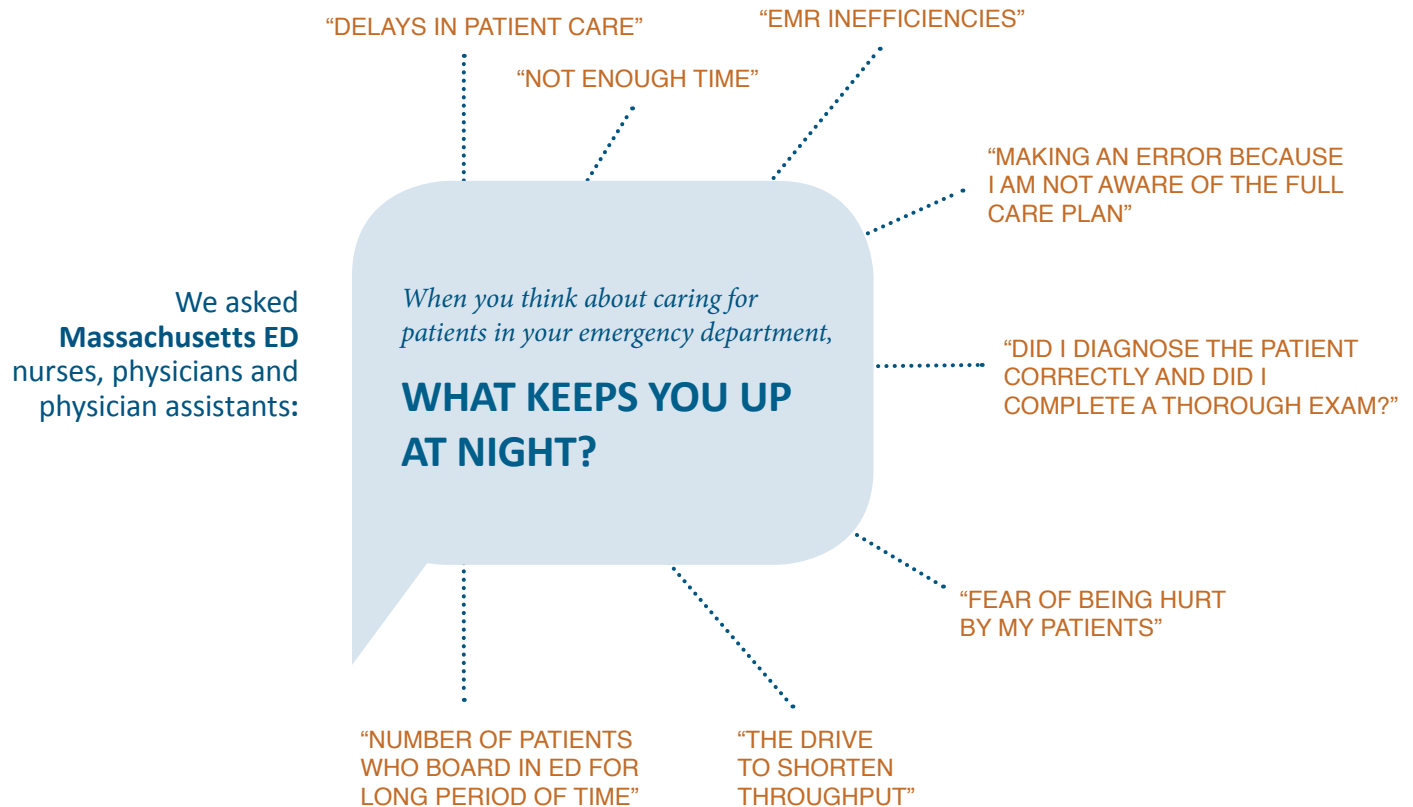


Patient volume in the ED is unpredictable, and decisions must be made under significant time pressure, frequently with limited information, limited resources, and in the context of increasing patient complexity. Emergency department caregivers must contend with frequent interruptions, electronic medical records systems that disrupt clinical workflow, a staffing mix that varies day-to-day, and a need to task-switch in order to keep pace with patients' needs.

In this context, it is not surprising that adverse events occur. Studies estimate that:

- As many as six percent of all patients seen in an emergency department experience an adverse event.
- Most common errors are related to patient management, diagnosis and medications.
- Of the adverse events that occur in the ED, between 53 and 83 percent are likely preventable, compared to 21 to 51 percent for all hospital-based events.

In addition, it is worth noting that emergency physicians rank in the top-five list of most burnt-out clinical specialists, with 48 percent reporting that they feel burned-out in a recent survey. The same is true for emergency nurses, with 82 percent in one study reporting mid-to-high levels of burnout, causing many to consider leaving the profession. Since clinician burnout may contribute to adverse events as well as be exacerbated by them, care for the wellbeing of emergency medicine clinicians is an emerging priority.



## EXPERT PANEL ON IMPROVING SAFETY IN EMERGENCY MEDICINE

The 14 members of the expert panel represent a wide variety of perspectives and roles in and around the emergency department, including patients, physicians, pharmacists, nurses, physician assistants, emergency medicine technicians and administrators. Guided by a small steering committee of health care leaders in Massachusetts, the panel met monthly from July 2018 through June 2019 to develop its findings and recommendations. The panel's work was informed by surveys about safety risks in the ED setting sent to members of MACEP, MENA and MAPA, ensuring the inclusion of as many voices from the frontline ED provider community as possible. In addition, many Massachusetts hospitals contributed their own proven strategies for mitigating safety risks in the ED to the toolkit.

## KEY PANEL FINDINGS AND RECOMMENDATIONS

The Expert Panel identified three overarching patient safety challenges in Massachusetts EDs. All three affect the emergency department in unique ways, though they are not unique to the field of emergency medicine. Similarly, robust solutions to the problems are cross-cutting and cannot always be fully addressed within the emergency department. That said, the panel strived to identify recommendations and strategies that may be implemented by the ED without significant investment of time and resources by other hospital departments.

*“The daily challenges that we face in the ED—the crowding, the time pressure, the unpredictable flow of patients—pushes us as a discipline to be flexible, creative and innovative. That’s just one thing that’s exciting about working in emergency medicine.”*

- Emergency nurse, MENA member

*“The volume of older, sicker, more complicated patients is increasing and we know that the numbers of these patients will be going up significantly over the next decade.”*

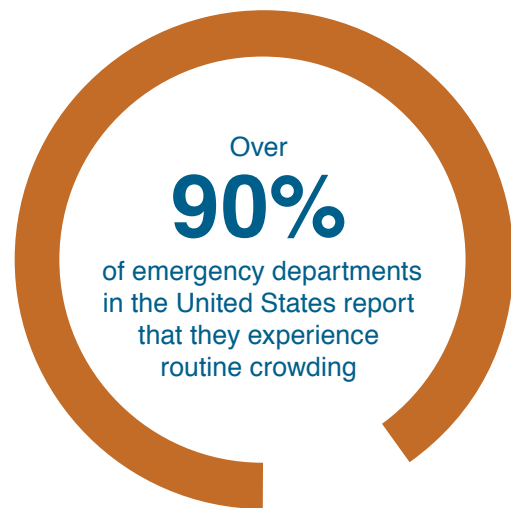
- Emergency physician, MACEP member

## I. CROWDING

Crowding is the condition that “occurs when the identified need for emergency services exceeds available resources for patient care in the emergency department, hospital, or both” and is a common and persistent experience in Massachusetts emergency departments. Crowding contributes to various patient safety risks, including delayed triage and treatment, patients leaving without being seen, medication-related errors, communication errors between units, failure to rescue or reassess, patient falls, and intentional injuries.

### Opportunities to reduce crowding:

- Optimize patient flow within the ED to reduce crowding;
- Implement resource and personnel management policies to mitigate risks during times of peak crowding; and
- Explore alternatives to traditional inpatient admissions.



SOURCE: American College of Emergency Physicians, 2016.

*“Emergency medicine is a team discipline, so the solutions must be multidisciplinary, too.”*

- Emergency nurse, MENA member

## II. COGNITIVE OVERLOAD

Cognitive overload is a challenge that many emergency medicine professionals experience as they manage patients while sorting through an overwhelming amount of information from patients, colleagues, and the electronic health record system. Compounding the challenge is that members of the clinical team experience frequent interruptions that cause them to task-switch, increasing the risk that an error will occur. Cognitive overload contributes to numerous patient safety risks, including missed or delayed diagnosis and treatment, medication errors and inappropriate or unnecessary treatment or procedures.

### Opportunities to reduce cognitive overload:

- Adopt strategies to limit interruptions, especially during the execution of complex and critical tasks by differentiating between high- and low-acuity messages;
- Support all members of the care team to practice at the top of his/her license by rebalancing tasks, eliminating extraneous tasks or realigning tasks to appropriate personnel resources, including non-clinical team members;
- Adopt and actively promote the use of cognitive job aids to reduce the amount of working memory necessary for common tasks;
- Optimize use of the electronic health records (EHR) system to reduce cognitive burden posed by EHR system;
- Adopt a team-based approach that focuses on situational awareness and shared responsibility for patient safety; and
- Support clinical staff in engaging in self-care as a way to improve a provider's ability to manage their cognitive load.

## III. POST-ED CARE COORDINATION

Post-ED care coordination is essential for patients, but often difficult for busy EDs to manage given the time needed to provide effective discharge instructions and establish a follow-up plan. Care coordination is especially important for vulnerable patient populations such as the frail elderly, medically or socially complex patients, and pediatric patients. Patients leaving the ED for home or another community setting with an inadequate follow-up plan are at risk of missing critical medical appointments, taking medications incorrectly, having their condition worsen, or revisiting the ED.

### Opportunities to improve post-ED care coordination:

- Review new and changed medications prior to discharge to ensure that patients will be taking the appropriate medications upon discharge;
- Develop a standardized discharge process for patients who are being discharged to home or another community setting;
- Take steps to ensure that patients and their caregivers receive effective education, including education at the appropriate reading level and language, as part of the discharge process;
- Identify patients who may have social or medical needs that impede their ability to access follow-up care;
- Develop a process to reach patients who have been discharged recently to ensure that if they have any questions about their ED stay or follow-up care, a clinician at the hospital can help them get the answers;
- Develop a process to follow-up on results that are pending at discharge (e.g. follow up nurses) to ensure that results are reviewed and communicated to the patient; and
- Utilize existing digital tools to help ensure that information about the patient's ED visit is documented in a timely fashion and available for the follow-up provider.

In conjunction with this report, the Expert Panel is releasing a set of strategies that track to each of its recommendations. Illustrative case studies and tools are also included to help emergency medicine teams implement the strategies.

For more information, please visit [BetsyLehmanCenterMA.gov/EDsafety](https://BetsyLehmanCenterMA.gov/EDsafety)





## INTRODUCTION

The emergency department is a “complex system, optimized to operate on the edge of chaos.”<sup>1</sup> Each year, emergency departments across the United States are visited over 145 million times by patients of all ages and with all levels of acuity.<sup>2</sup> Over the course of a year, almost 20 percent of the US adult population is seen in an ED.<sup>3</sup> In Massachusetts, patients seek care in the emergency department at a higher rate than the national average, though the gap narrowed from 2011-2016.<sup>4</sup> On average, 50 to 75 percent of patients admitted to the hospital come through the emergency department.<sup>5</sup>

The working environment in an emergency department is unlike any other medical setting. Patient volume in the ED is unpredictable and decisions must be made under significant time pressure, frequently with limited information, limited resources, and in the context of increasing patient complexity. Emergency department caregivers must contend with frequent interruptions,<sup>6</sup> electronic medical records systems that disrupt clinical workflow, a staffing mix that varies day-to-day, and a need to task-switch in order to keep pace with patients’ needs.<sup>7</sup>

In addition to the stressors inherent to the working environment in the ED, clinicians must also cope with a shift-work schedule that often calls for disruption of normal sleep patterns and offers only limited opportunities for meal and restroom breaks. Sleep deprivation not only impacts the health and well-being of the emergency department staff,<sup>8</sup> but may also impact the quality of care provided to patients.<sup>9</sup> Not surprisingly, emergency physicians rate as the most burned out (59 percent) of any clinical specialty group. Like sleep deprivation, burnout contributes to poorer outcomes for patients and a greater likelihood of attrition.<sup>10</sup> Nurses who work in the ED show higher rates of burnout compared to their colleagues in other areas of medicine, with 82 percent in one study reporting mid-to-high levels of burnout, causing many to consider leaving the profession altogether.<sup>11</sup>

In this context, it is not surprising that adverse events occur. Studies estimate that:

- As many as six percent of all patients seen in an emergency department experience an adverse event.<sup>12</sup>
- Most common errors are related to patient management, diagnosis and medications.<sup>13</sup>

- Of the adverse events that occur in the ED, between 53 and 83 percent are likely preventable, compared to 21 to 51 percent for all hospital-based events.<sup>14</sup>
- Of those adverse events that are preventable, a greater number were among the discharged population (71.4 percent) compared to those who are admitted (41 percent).<sup>15</sup>

Compared to other departments in the hospital, EDs are significantly less able to control the timing, volume, or length of patient visits. The ED must manage variability in patient flow depending on time of day, week and season and is also vulnerable to fluctuations in community outpatient capacity and the hospital’s inpatient bed capacity.<sup>16,17</sup>

## EXPERT PANEL ON IMPROVING SAFETY IN EMERGENCY MEDICINE

Massachusetts emergency departments rank high in a national review of ED quality and safety, according to the American College of Emergency Physicians. Yet many front line staff express concerns that the environment is not as safe as it needs to be for patients or staff. In response to these concerns from their members, leaders of the Massachusetts College of Emergency Physicians (MACEP) reached out to the Betsy Lehman Center to help facilitate improvement in the safety of EDs across the state. The Massachusetts Emergency Nurses Association (MENA) and the Massachusetts Association of Physician Assistants (MAPA) joined as partners in the effort.

Through this collaboration, the Betsy Lehman Center convened an expert panel to identify key risks to safety in emergency departments, recommend practical steps for mitigating these risks, and develop a toolkit to support implementation of the recommendations. The 14 members of the panel represent a wide variety of perspectives and roles in and around the ED, including patients, physicians, pharmacists, nurses, physician assistants, emergency medicine technicians and administrators. Guided by a small steering committee of health care leaders in Massachusetts, the panel met monthly from July 2018 through June 2019 to develop its findings and recommendations. The panel’s work was informed by surveys about safety risks in the ED setting sent to members of MACEP, MENA and MAPA. In addition, many area hospitals contributed their own proven strategies for mitigating safety risks in the ED to the online toolkit that accompanies this report.

## EMERGENCY MEDICINE SAFETY IN MASSACHUSETTS

Although emergency departments, like all clinical environments, experience patient safety risks, there are limited data to help quantify the types of harm and degree of risks that currently exist in Massachusetts. To help bridge this gap and in support of this initiative, the Expert Panel relied on a number of sources of information, including:

1. A survey of frontline emergency medicine providers in Massachusetts conducted with support of the MACEP, MAPA and MENA in 2017;
2. A summary of Serious Reportable Events (SREs) from Massachusetts emergency departments from 2011-2016; and
3. An analysis of patient safety incidents in Pennsylvania emergency departments from 2011-2016.

## 2017 EMERGENCY MEDICINE WORKFORCE SURVEY

The Betsy Lehman Center conducted online surveys of members of three professional organizations, MACEP, MENA, and MAPA, to solicit perspectives from frontline workers regarding adverse events and other issues related to caring for patients who enter the hospital through the emergency department.<sup>18</sup> The survey responses highlighted concerns related to extended “boarding” of patients in emergency departments, a practice whereby “a patient remains in the emergency department after the patient has been admitted or placed into observation status at the facility, but has not been transferred to an inpatient or observation unit.”<sup>19</sup> Respondents cited other conditions that make for a crowded, time-pressured environment and described needs and opportunities to improve systems and processes to ensure safe and reliable care — both within and beyond emergency departments.

The following tables summarize respondents’ rankings of the most prevalent adverse events and contributing factors in the ED. (See Appendix for additional details.)

## PERCEPTIONS OF MOST COMMON ADVERSE EVENTS

RANKING	MACEP (PHYSICIANS)	MAPA (PHYSICIAN ASSISTANTS)	MENA (NURSES)
1	Delayed or missed care in the ED	Delayed or missed care in the ED	Violence or abuse against staff
2	Patient left without being seen	Diagnostic error (missed/delayed/incorrect diagnoses)	Delayed or missed care in the ED
3	Violence or abuse against staff	Patient left without being seen	Patient left without being seen
4	Diagnostic error (missed/delayed/incorrect diagnoses)	Discharge of patient without adequate instructions or plan for follow-up treatment	Inadequate pain management
5	Medication errors	Healthcare-associated infections	Falls with injury

## PERCEPTIONS OF MOST COMMON CONTRIBUTING FACTORS TO ADVERSE EVENTS

RANKING	MACEP (PHYSICIANS)	MAPA (PHYSICIAN ASSISTANTS)	MENA (NURSES)
1	Boarding of behavioral health patients	Overcrowding	Boarding of behavioral health patients
2	Boarding of medical/surgical patients	Boarding of behavioral health patients	Overcrowding
3	Overcrowding	Patient left without being seen	Boarding of medical/surgical patients
4	Time-pressured environment	Boarding of medical/surgical patients	Understaffing
5	Understaffing	High productivity expectations	Time-pressured environment

## SERIOUS REPORTABLE EVENTS IN MASSACHUSETTS EMERGENCY DEPARTMENTS

In addition to the workforce survey, the Betsy Lehman Center reviewed Serious Reportable Events (SREs) that occurred in emergency departments from January 2011-October 2016 as reported to the Department of Public Health by Massachusetts hospitals. Serious reportable events are defined by the National Quality Forum as events belonging to one of 28 categories events and by state regulation must be reported by hospitals and ambulatory surgery centers to the Massachusetts Department of Public Health.<sup>20</sup> While SREs are likely under-reported, they are useful as “signal” data for understanding system-wide risks.

The incidence and contributors to ED-associated SREs, as summarized in the table below, reveal both consistencies and gaps between clinicians’ perceptions of risk and the types of adverse events that hospitals actually report.

For instance, while falls with serious injury are by far the most frequently-reported SRE in the ED, emergency physicians, nurses and physicians assistants perceive the incidence of falls to be outside of the five most common adverse events. Similarly, patient self-harm events represent 11 percent of ED-associated SRE reports, but do not even appear among the top 10 most common adverse events in the ED physician survey results. The role of boarding and a time-pressured environment are reflected in both the survey results and SRE analysis.

The state of Pennsylvania collects significantly more data about adverse events and other patient safety incidents from health care providers than does Massachusetts. The Pennsylvania Patient Safety Authority generously shared its analysis of recent ED-related incidents, which also informed the panel’s understanding of key contributors to safety risks. (See Appendix.)

## MOST COMMON SERIOUS REPORTABLE EVENTS AND CONTRIBUTING FACTORS IN MASSACHUSETTS EMERGENCY DEPARTMENTS

January 2011 - October 2016

Types of SREs in the ED (n=293)	Hospital-identified contributors to SREs in the ED
<ul style="list-style-type: none"> <li>Falls (n=155, 53%)</li> </ul>	<ul style="list-style-type: none"> <li>SREs involving boarded patients (n=27)</li> </ul>
<ul style="list-style-type: none"> <li>Medication errors (n=34, 12%)</li> </ul>	<ul style="list-style-type: none"> <li>Patient harm partially or fully attributable to poor communication during transitions or handoff (n=18)</li> </ul>
<ul style="list-style-type: none"> <li>Self-injuries (n=33, 11%)</li> </ul>	<ul style="list-style-type: none"> <li>Patient self-harm due to unsafe environments within the ED (n=10)</li> </ul>
<ul style="list-style-type: none"> <li>Physical assaults (n=26, 9%)</li> </ul>	<ul style="list-style-type: none"> <li>Medication error partially or fully attributable to electronic dispensing or ordering practices (n=7)</li> </ul>
<ul style="list-style-type: none"> <li>Other (n=45, 15%)</li> </ul>	<ul style="list-style-type: none"> <li>Equipment failures (n=5)</li> </ul>

## KEY CHALLENGES IN EMERGENCY MEDICINE

Taking into account the workforce survey, data from ED-related SREs, published literature regarding patient safety in the ED and their own experience working in Massachusetts EDs, the Expert Panel members identified three overarching patient safety challenges that emergency medicine professionals face in Massachusetts. Recognizing the broad range of safety issues facing emergency medicine clinicians and staff, the expert panel focused on interventions that could be executed from “within the four walls” of the ED.

<p><b>I. CROWDING</b></p> <p>Crowding “occurs when the identified need for emergency services exceeds available resources for patient care in the emergency department, hospital, or both”<sup>21</sup> and is a common and persistent experience in Massachusetts emergency departments.<sup>22</sup> Crowding contributes to various patient safety risks, including delayed triage and treatment, patients leaving without being seen, medication-related errors, communication errors between units, failure to rescue or reassess, patient falls, and intentional injuries.</p>	<p><b>II. COGNITIVE OVERLOAD</b></p> <p>Many emergency medicine professionals experience cognitive overload as they manage a large number of patients while sorting through the vast amount of information they receive from patients, colleagues, family members, bystanders, and the electronic health record system. Compounding the challenge of processing all the information is that members of the clinical team experience frequent interruptions that cause them to task-switch, increasing the risk that an error will occur. Cognitive overload contributes to numerous patient safety risks, including missed or delayed diagnosis and treatment, medication errors and inappropriate or unnecessary treatment or procedures.</p>	<p><b>III. POST-ED CARE COORDINATION</b></p> <p>Though often essential, busy EDs can’t always find the time to provide effective discharge instructions and establish a follow-up plan for patients. Care coordination is especially important for vulnerable patient populations such as frail older adults, medically or socially complex patients, and pediatric patients. Patients leaving the ED for home or another community setting with an inadequate follow-up plan are at risk of missing critical medical appointments, taking medications incorrectly, having their condition worsen, revisiting the ED, or even death.</p>
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## I. CROWDING

Emergency department crowding was identified as a problem in Massachusetts hospitals more than 20 years ago and remains a persistent challenge despite numerous statewide policy and hospital-based practice improvement initiatives.<sup>23</sup> ED crowding is associated with a variety of negative outcomes<sup>24</sup> including increased morbidity and mortality among patients,<sup>25</sup> increased inpatient length of stay,<sup>26</sup> increased rates of preventable medical errors<sup>27</sup> and decreased satisfaction among emergency department patients and staff.

Crowding increases stress among staff and patients, raising the risk of intentional and unintentional injuries to staff and patients. Crowding also contributes to negative downstream outcomes such as increased mortality and longer inpatient length of stay.

Acknowledging that ED crowding is largely caused by forces outside the control of those working in emergency departments today – such as hospital capacity constraints, allocation of hospital resources, and admissions processes that lead to boarding of admitted patients in the ED – this section will focus on strategies that care teams may implement within the ED to mitigate the patient safety risks posed by crowding.<sup>28</sup>

### SAFETY RISKS

Safety risks associated with crowding include:

- Patients leave without being seen<sup>29</sup>
- Delayed triage and treatment<sup>30</sup>
- Orders and medication related errors<sup>31</sup>
- Communication errors between units
- Failure to rescue or reassess
- Intentional injuries<sup>32</sup>
- Patient falls

### RECOMMENDATIONS

While recognizing that crowding is an issue that ultimately will require systems- and policy-level changes to eliminate, the harmful effects of crowding in emergency departments can be mitigated using some of the following methods:

#### 1. Optimize patient flow within the ED to reduce crowding.

##### Strategies:

- **Point of care testing:** Establish a point-of-care testing lab in the ED to process a limited set of routine tests to speed results and diagnosis.<sup>33</sup>
- **Split flow structure (also called “streaming”):** Split patients into groups based on their condition and treatment needs, which allows separate teams to tend to patients based on acuity, reducing length of stay for low-acuity patients.<sup>34</sup>
- **Fast track:** Establish a “fast-track” area for patients with the lowest acuity scores,<sup>35</sup> enabling them to be treated and released faster while also allowing the ED team to focus more time on higher-acuity patients.<sup>36</sup>
- **Vertical patient flow model:** Create more capacity during peak times using vertical flow, a split flow model that replaces traditional ED beds with recliners for patients with lower acuity scores (ESI-3 or lower). The use of recliners increases capacity and reduces length of stay for these patients.<sup>37</sup>
- **Designate an ED flow coordinator:** Use a coordinator who is empowered to expedite and facilitate the movement of patients through the ED to reduce length of stay and percent of patients who leave without being seen.<sup>38</sup>

2. Activate resource and personnel management policies to mitigate risks during times of peak crowding.

#### Strategies:

- **Operationalize the ED's Code Help policy:** Use the hospital's Code Help policy to temporarily reduce strain caused by crowding by bringing other hospital resources to the aid of the ED.
- **Pursue an aggressive bed management strategy within the entire institution:** Utilize a "bed czar" or other mechanism that facilitates the use of inpatient beds to alleviate ED crowding during peak times.
- **Explore implementation of hallway boarding:** Board stable ED patients in hallways on inpatient floors during times of crowding to reduce congestion in the emergency department.<sup>39</sup>

3. Explore alternatives to traditional inpatient admissions.

#### Strategies:

- **Hospital at Home:** Discharge patients with certain conditions from the ED to their homes with inpatient level care rather than admitting to the hospital.<sup>40</sup>
- **Mobile integrated health or community paramedicine:** Utilize mobile integrated health or community paramedicine to provide urgent treatment and, if appropriate, avoid an ED visit.<sup>41</sup>

## II. COGNITIVE OVERLOAD

The working environment in an emergency department is unlike any other medical setting. Patient volume in the ED is unpredictable and often overwhelming, and decisions must be made under significant time pressure, frequently with limited information, limited resources, and in the context of increasing patient complexity. In addition, like other medical professionals, emergency department clinicians must contend with frequent interruptions,<sup>42</sup> electronic medical records systems that disrupt clinical workflow, a staffing mix that varies day-to-day, and a need to task-switch in order to keep pace with patients' needs.<sup>43</sup>

Under these conditions, ED clinicians are challenged to maintain their focus, increasing the risk that an error will occur. The challenges associated with processing and acting on information in a busy emergency department can be better understood through the principles of cognitive load theory, which proposes that human memory is divided into three parts: sensory memory, long term memory and working memory.<sup>44</sup>

While sensory and long term memory perform important functions, working memory is used to complete current tasks. This aspect of working memory is limited in that it can only hold a small amount of information at any given time and that information is easily forgotten.<sup>45</sup> Working memory is burdened by both intrinsic load - the weight or complexity of a particular task - and extraneous load - the way that the information is presented to the clinician making the decision or completing the task.<sup>46</sup> When working memory gets overloaded, performance suffers, and in the context of medical care, patient outcomes may suffer as well.<sup>47</sup>

The proposed recommendations below seek to reduce the burden on working memory, freeing clinicians to execute tasks and make complex diagnostic and treatment decisions.



## SAFETY RISKS

Safety risks associated with crowding include:

- Missed or delayed diagnosis and treatment
- Medication errors<sup>48</sup>
- Inappropriate or unnecessary treatment or procedures

## RECOMMENDATIONS

In order to reduce the safety risks associated with cognitive overload among emergency department clinicians in Massachusetts, hospitals can:

1. Adopt strategies to limit interruptions, especially during the execution of complex and critical tasks by differentiating between high- and low-priority information.

### Strategies:

- **Develop interruption guidelines** to address preventable interruptions and educate staff about the harms of unnecessary interruptions.<sup>49</sup>
  - **Assign tasks that cause frequent interruptions** (e.g., transfers/lab follow-up) to one team member per shift and realign other tasks so that the assigned team member can focus on only those tasks.
  - **Set certain off-limit times/zones** for clinicians during critical times, such as medication prescribing<sup>50</sup> and administration,<sup>51</sup> sign-off<sup>52</sup> and discharge to enable more reliable execution of these critical tasks.
  - **Use tools for communication of non-urgent messages** (e.g., an electronic whiteboard<sup>53</sup> or secure text applications<sup>54</sup>) that clinicians may check when they have the opportunity rather than breaking their task.
2. Support all members of the care team to practice at the top of his/her license by rebalancing tasks, or realigning tasks to appropriate personnel resources, including non-clinical team members.

### Strategies:

- **Implement a scribe program:** Medical scribes assist with documentation, reducing the amount of time physicians must spend at the electronic health record and increasing time for direct patient care.<sup>55</sup> Emergency departments may use scribes to document, perform order entry, admit/discharge, request consults, pull-up prior patient data, and alert providers to new/important information.

- **Use the pharmacy team** to assist with medication selection and safety, care of critically ill patients, antimicrobial stewardship, and calculation of weight-based dosing.<sup>56</sup> Studies show that having a pharmacist on staff in the ED may reduce medication errors by two-thirds.<sup>57</sup>
  - **Use pharmacy technicians** to complete medication histories and medication reconciliation. This has been shown to both increase accuracy of medication histories and reduce medication errors by as much as half.<sup>58,59</sup>
  - **Use paramedics within the ED** to complete tasks such as triage, starting IVs, and offloading patients from arriving Emergency Medical Services units.<sup>60</sup>
3. Adopt and actively promote the use of cognitive job aids to reduce the amount of working memory necessary for routine tasks.

### Strategies:

- **Identify and implement key clinical pathways** that are up-to-date and readily accessible to clinicians to help guide triage and treatment of patients.<sup>61,62</sup>
  - **Use kits or carts** for select procedures to reduce the need for hunting and fetching of materials and equipment, enabling providers to stay focused on performing the procedure.
  - **Implement checklists** for use during procedures that are high-risk but infrequently performed to reduce the risk of complications.<sup>63,64</sup>
4. Optimize use of the electronic health records (EHR) system to reduce cognitive burden posed by the EHR system itself. Emergency medicine physicians report spending approximately 23 to 65 percent of their clinical time completing electronic documentation in the EHR.<sup>65,66</sup>

### Strategies:

- **Adopt only clinically validated EHR reminders** to prevent interruptions that are clinically meaningless and poorly targeted.<sup>67</sup>
- **Establish an EHR governance structure** to consult with clinical end-users, monitor use of alerts and complete a periodic reassessment to ensure that they are clinically appropriate and relevant.



5. Adopt a team-based approach that focuses on situational awareness and shared responsibility for patient safety.<sup>68</sup>

#### Strategies:

- Use **huddles at key times** to ensure communication of important information.<sup>69</sup>
- Promote **awareness among team members** of each other, in particular their identified roles/responsibilities and experience level.

6. Support clinical staff in engaging in self-care to improve their ability to manage their cognitive load.

#### Strategies:

- Implement a **peer-support program**.
- Use **hospital wellness resources** to provide specific support to ED clinical teams.
- Adopt scheduling strategies that allow ED clinical teams **time to meet basic needs**, including meals, restroom breaks and lactation.

### III. POST-ED CARE COORDINATION

Care coordination is essential for patients, but often difficult for busy EDs to manage given the time needed to provide effective discharge instructions and establish a follow-up plan.<sup>70</sup> This is especially true for patients who are being discharged from the ED to their home or to another community setting. According to the Agency for Health Care Research and Quality, the ED discharge process should achieve three basic functions: (1) communicate with and educate patients; (2) support post-ED discharge care and (3) coordinate care with other providers.<sup>71</sup> Care coordination can help ease this transition and ensure that critical information and resources are available so patients are able to obtain the follow-up care they need.

#### SAFETY RISKS

Specific risks accrue for patients who are discharged home after an emergency department visit. These risks include:

- Lack of necessary follow-up to ensure treatment of identified medical condition;
- Lack of follow-up on test results obtained after a patient has been discharged;<sup>72</sup>
- Medication-related errors<sup>73</sup>

These risks lead to poorer outcomes for patients, including worsening of medical conditions and the need to return to the ED for additional care and possible admission to the hospital.

#### WHAT IS CARE COORDINATION?

Care coordination is the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of health care services. Organizing care involves the marshalling of personnel and other resources needed to carry out all required patient care activities, and is often managed by the exchange of information among participants responsible for different aspects of care. (Agency for Healthcare Research and Quality, 2014)

## RECOMMENDATIONS

To help ensure that patients who are discharged to the community have a successful transition, all hospitals in Massachusetts can:

1. Review new and changed medications prior to discharge.
2. Develop a standardized discharge process for patients going home or to another community setting.

### Strategies:

- Use a **checklist** to ensure each step of the discharge process is completed.
- Use a **standardized discharge form** for patients who are headed home.
- 3. Ensure that patients and their caregivers receive effective education at the appropriate reading level and language as part of the discharge process.<sup>74</sup>

### Strategies:

- Use the **teach-back method** to help ensure patient and family comprehension of the most important elements of their discharge instructions.<sup>75</sup>
- Implement a **time-out at discharge** to allow for protected time for the care team and patient/family members during discussion of discharge instructions.
- 4. Identify patients who may have social or medical needs that impede their ability to access follow-up care.<sup>76</sup>

### Strategies:

- Utilize **screening tools** that help to identify high-need patients and coordinate with care managers to address needs prior to discharge.<sup>77,78</sup>
- Use **digital platforms** (e.g., Collective Medical, Patient Ping) to help gather information about patients who have been previously screened as having special medical or social needs.
- Use **specialized team members** (e.g., community health workers, care coordinators, community paramedics, navigators) or systems (e.g. mobile integrated healthcare) to help with screening and discharge planning for high-need patients.
- Develop and periodically update **special discharge strategies** for high-need patients.

5. Conduct outreach to patients who have been discharged recently to ensure that if they have any questions about their ED stay or follow-up care, a clinician at the hospital can provide answers.

### Strategies:

- Call or text message all recently discharged patients to screen for concerns.<sup>79,80</sup>
- Use **post-discharge home visits** or mobile integrated healthcare to provide follow-up to special populations.<sup>81</sup>

6. Develop a process to follow-up on test results that are pending at discharge (e.g. follow up nurses) to ensure they are reviewed and communicated to the patient.

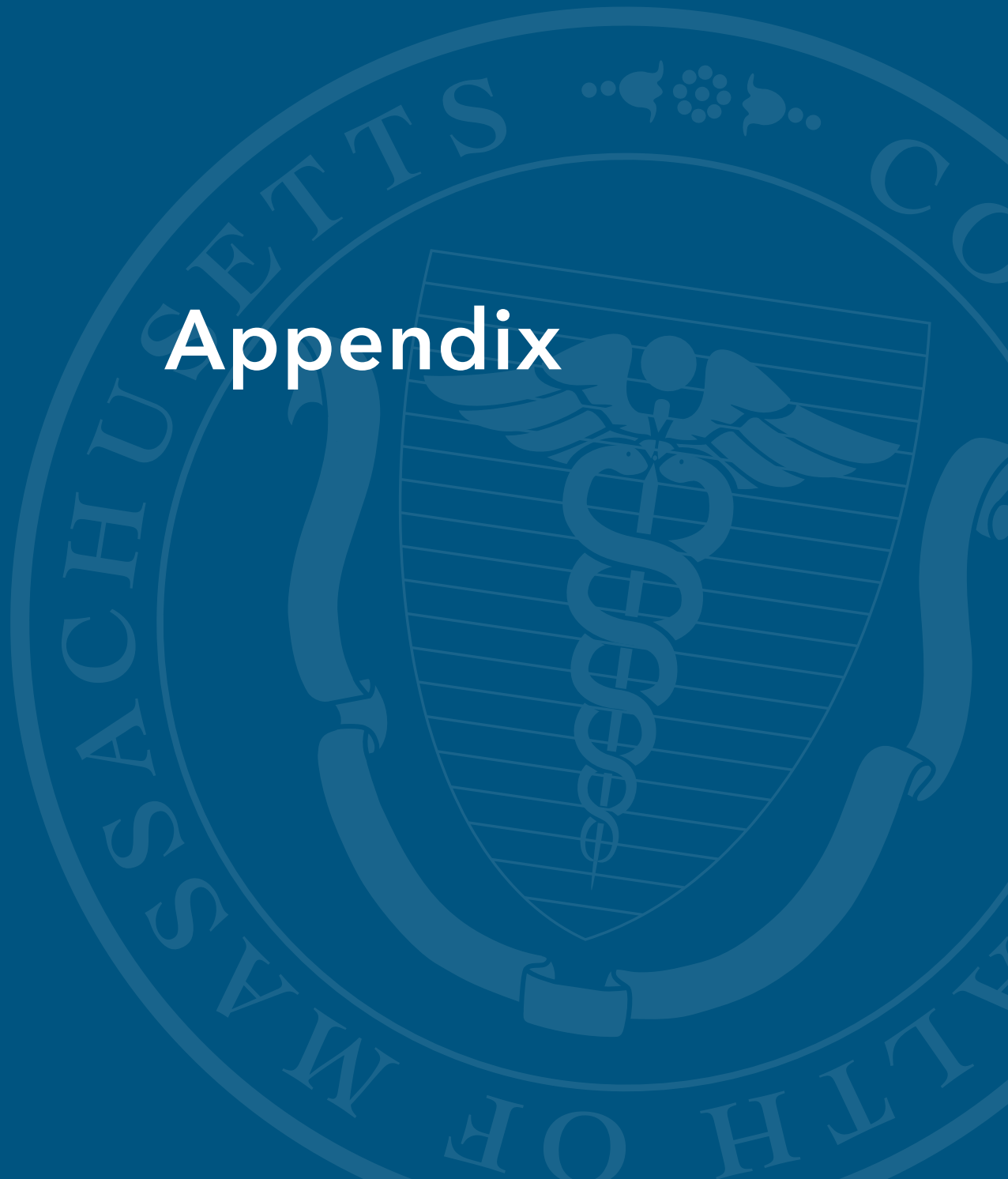
### Strategies:

- Utilize **electronic tools** to prompt follow-up on pending test results.<sup>82</sup>
- Include list of **pending test results in discharge notes** to prompt follow-up.

7. Utilize digital tools to help ensure that information about the patient's ED visit is documented in a timely fashion and available for the follow-up provider.

To support ED implementation of the foregoing recommendations and strategies, the Expert Panel developed over 25 case studies and identified other practical tools using information contributed by hospitals across the state and beyond. The case studies and tools can be found in the appendix and online at [BetsyLehmanCenterMA.gov/EDsafety](https://BetsyLehmanCenterMA.gov/EDsafety).

# Appendix



## A. EMERGENCY DEPARTMENT CASE STUDIES



### Crowding

Baystate Medical Center

**Nurse flow coordinator increases efficiency and productivity**

Beth Israel Deaconess  
Hospital–Needham

**Point-of-care testing helps to expedite care and reduce emergency department wait time**

Boston Children's Hospital

**A creative use of space helps meet emergency department needs and expedite care**

Froedtert Hospital (WI)

**Emergency department implements split-flow process to help ease crowding**

Lowell General Hospital

**Rapid Medical Evaluation program reduces length of emergency department stay**

Massachusetts General  
Hospital

**Home Hospital Program helps reduce ED crowding and improves the patient experience**

**Using a "Capacity Physician" to find creative, collaborative solutions to overcrowding**

**Using a Full-Capacity Protocol to allow inpatient floor boarding in times of peak ED capacity**

Sturdy Memorial Hospital

**"Quick Care" for non-emergent patients reduces wait times, improves patient experience in the ED**



### Cognitive overload

Baystate Medical Center

**Airway carts reduce cognitive load, improve preoxygenation techniques**

**Team huddles foster communication and collaboration in emergency department**

Berkshire Health Systems

**Wellness team helps reduce stress and fatigue, promotes mindfulness for physicians and staff**

Beth Israel Lahey Health

**Governance structure helps manage EHR change**

Boston Children's Hospital

**Checklists improve success rates for high-risk, low-frequency procedures in the emergency department**

Cambridge Health Alliance

**Routine team huddles help improve communication and situational awareness**

Lowell General Hospital

**Paramedics help improve flow in emergency department**

St. Anne's Hospital

**Implementing a discharge time-out for improved safety and patient satisfaction**

Sturdy Memorial Hospital

**Eliminating interruptions to improve emergency care**

UMass Memorial Health Care

**Clinical guidelines help emergency departments provide best care possible**

**Scribe program allows for more direct provider-patient care**



### Care coordination

Baystate Noble Hospital

**Complex Care Team aims to reduce readmissions for high-needs patients**

Beth Israel Deaconess  
Hospital–Milton

**Strategy to reduce ED boarding of patients with behavioral health diagnoses**

Beth Israel Lahey Health

**Hospitals use specialized team, including pharmacists, to promote post-discharge care coordination**

Boston Children's Hospital

**"Golden Ticket" dramatically improves discharge safety**

Holyoke Medical Center

**Investing in high-touch care coordination to reduce emergency department revisits**

St. Anne's Hospital

**Implementing a discharge time-out for improved safety and patient satisfaction**

Sturdy Memorial Hospital

**Electronic call system helps improve post-discharge care**

# Airway carts reduce cognitive load, improve preoxygenation techniques

BAYSTATE MEDICAL CENTER

The emergency department at University of Massachusetts Medical School Baystate Medical Center in Springfield is the largest in the western part of Massachusetts, with 94 licensed bays that span 72,000 square feet, and over 120,000 patient visits each year.

## Challenge

Emergency airway management is a critical skill for emergency physicians to master, but with many steps for preparation, the potential for numerous complicating factors, and a need to work quickly, it can be difficult for physicians to easily recall all the steps necessary to plan for and complete a successful intubation.

## Action

In 2012, Baystate Medical Center opened a new emergency department, which prompted a review of existing equipment in the ED. As part of this transition, and to improve airway management outcomes, Baystate took the opportunity to develop and implement a standardized airway cart to make all airway equipment easily accessible to ED clinical teams. The standardized airway cart is used throughout the emergency department and all staff are trained on best practices in airway management using the cart as a guide for preparation. This allows physicians to cognitively off-load the steps it takes to prepare for intubation and rely on the cart to provide prompts.

Each airway cart has six drawers, and each drawer contains materials that correspond to a crucial step in the airway procedure planning process. The top drawer focuses on pre-oxygenation, and contains all the materials that a physician might need to open up

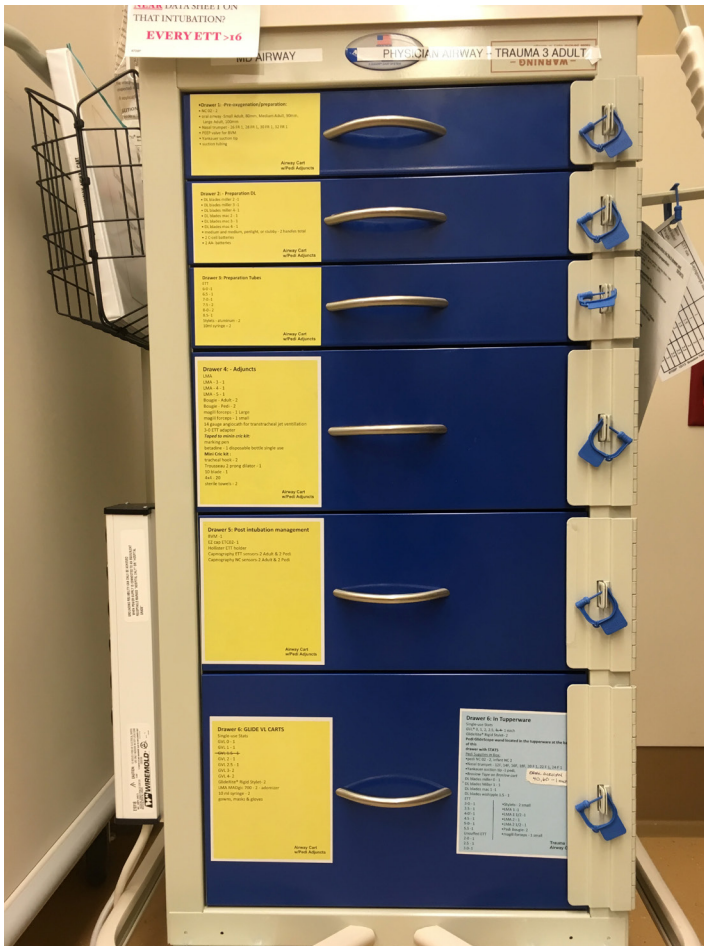
the airway, keep the airway open and improve positive pressure. The next drawer down offers a selection of tubes for use depending on the patient's physical characteristics, followed by a drawer below that containing an array of laryngoscopes. The next drawer down holds all of the adjunct equipment, including bougies that act as a tube introducer for use when there is an obstructed view of the airway, supraglottic airway devices, and materials for a front of neck or surgical airway if necessary.

This drawer helps a physician think through all of the challenges that might come with a particular intubation and to prepare for those challenges in advance. The next drawer holds materials needed for post-intubation management, including the Hollister devices to secure the ET tube, Bag Valve Masks, and wave form capnography. The bottom drawer holds supplies for videolaryngoscopes and awake intubations, and soon Baystate will have a videoscope paired with every cart.

Roll-out of the carts was paired with education, which included orientation to the cart contents and a reminder of the steps necessary to prepare for an intubation. Training included a special emphasis on preoxygenation, an important first step that, at the time, was often skipped for expedience, but makes a significant difference in terms of outcomes. Now, preoxygenation is standard practice at Baystate and is considered an essential and routine step.

## Lessons Learned

There are several key ingredients to success, according to Lucienne Lutfy-Clayton, MD, an associate professor in emergency medicine who led the effort and specializes in airway education. First, there needs to be a planning



process to identify the essential items for the cart, including any specialized equipment that the ED team might need. Second, there must be an upfront investment of resources to find the right carts, purchase them, and stock them with the equipment. Finally, it is important to have a strategy for education and implementation so that staff become familiar with the carts and they become integrated into practice.

◀ Example of an airway cart at Baystate Medical Center



# Nurse flow coordinator increases efficiency and productivity

## BAYSTATE MEDICAL CENTER

The emergency department (ED) at Baystate Medical Center in Springfield is the only Level 1 trauma, ST-elevation myocardial infarction and interventional stroke center in the western part of Massachusetts. The Baystate ED is the largest in the western part of the state, with 72,000 square feet, 94 licensed bays that spans and over 110,000 patient visits each year.

### Challenge

When Baystate Medical Center in Springfield, Massachusetts opened a new ED in December 2011, staff immediately faced a surge of new patients and an increase in those who left without being seen (LWBS) because of long wait (door-to-doctor) times. This led the ED leadership to reevaluate their patient flow processes to identify opportunities to reduce patients' wait times.

### Action

Prior to the opening of the new ED in 2011, nursing leadership had managed ED patient flow, but the structure was loosely organized, utilized only on an ad-hoc basis, and staff did not always have the appropriate skills for specific roles. To improve patient flow, the department developed a new operational leadership structure, assigning roles to specific personnel with demonstrated experience in management and communication.

Now, there are well-defined roles within nursing leadership and each has clear and specific responsibilities with regard to managing patient flow. On every shift, the charge nurse coordinates care throughout the ED and all pods, managing staff resources and requesting additional personnel and equipment when necessary. The charge nurse coordinates the transfer of admitted patients to appropriate inpatient settings and initiates calls for assistance from inpatient services when the boarding of admitted patients exceeds certain benchmarks. The charge nurse walks the floor and talks directly with staff to assess challenges and needs.

The ED flow coordinator monitors incoming patients, monitors demand in the waiting room and ensures that patients have a place to go. This specialized role accepts transfers and EMS reports regarding incoming traffic, and notifies the ED of arrivals from primary care and specialist physicians. The flow coordinator balances bed placement based on acuity for patients in the waiting room and those arriving by ambulance. An electronic tracking board helps the flow coordinator keep track of all patients.

The pod lead nurse coordinates care (input, throughput, and output) within each pod for every shift. The pod lead manages the direct communication among providers (attending physicians, physicians-in-training, and advanced practitioners) and the nursing staff and patient care technicians.

This design allows for both a horizontal and vertical chain of structural ED communication.

### Outcomes

Over the course of three years, from December 2012 to December 2015, the weekly mean number of patients seen per day rose 13 percent from 265-299 patients. The weekly mean percentage of patients who left without being seen declined 45 percent from 8.2-4.5 percent, without adding new nursing or physician staff.

#### Keys to success

- The focus for these roles was training nurses with demonstrated interest and enthusiasm for practice improvement.
- Strong communication skills are a critical element in choosing key players.

# Team huddles foster communication and collaboration in emergency department

## BAYSTATE MEDICAL CENTER

The emergency department (ED) at Baystate Medical Center in Springfield is the only Level 1 trauma, ST-elevation myocardial infarction and interventional stroke center in the western part of the state. The Baystate ED is the largest in the western part of Massachusetts, with 72,000 square feet, 94 licensed bays that spans and over 110,000 patient visits each year. Eighteen bays are dedicated to the care of children under the age of 18, and nine are designed for behavioral health patients. The remaining 67 bays are divided into four separate, but connected, pods for adult care. In this very large and busy ED, regular communication is key to managing flows of patients and information.

### Challenge

Recognizing that a critical component of ED care is communication between providers and nurses, staff began using huddles to better manage flow and improve the patient experience.

### Action

At the beginning of every shift, nurses and physicians in one of the four ED pods call a quick huddle with anyone who is available, including techs and administrative assistants. Each huddle begins with each staff member sharing their name and role. Then, they talk about the day's challenges, whether equipment or trauma services, and strategies for managing demand and productivity. Led collaboratively by the attending physician and nursing pod lead, the huddle takes only about five to seven minutes and bolsters communication and teamwork within the ED.

In addition, the ED has made it a requirement that each provider communicate directly with the primary nurse for every single patient at least once during the shift. This communication could range from a very brief check-in on a patient with a minor sprain or a more in-depth conversation on a patient with a complex condition.





# Complex Care Team aims to reduce readmissions for high-needs patients

## BAYSTATE NOBLE HOSPITAL

Baystate Noble Hospital is a 97-bed acute care community hospital in Westfield that sees approximately 32,000 visits each year in its emergency department (ED). Baystate Noble is part of Baystate Health, a large, non-profit integrated health care delivery system serving Western Massachusetts.

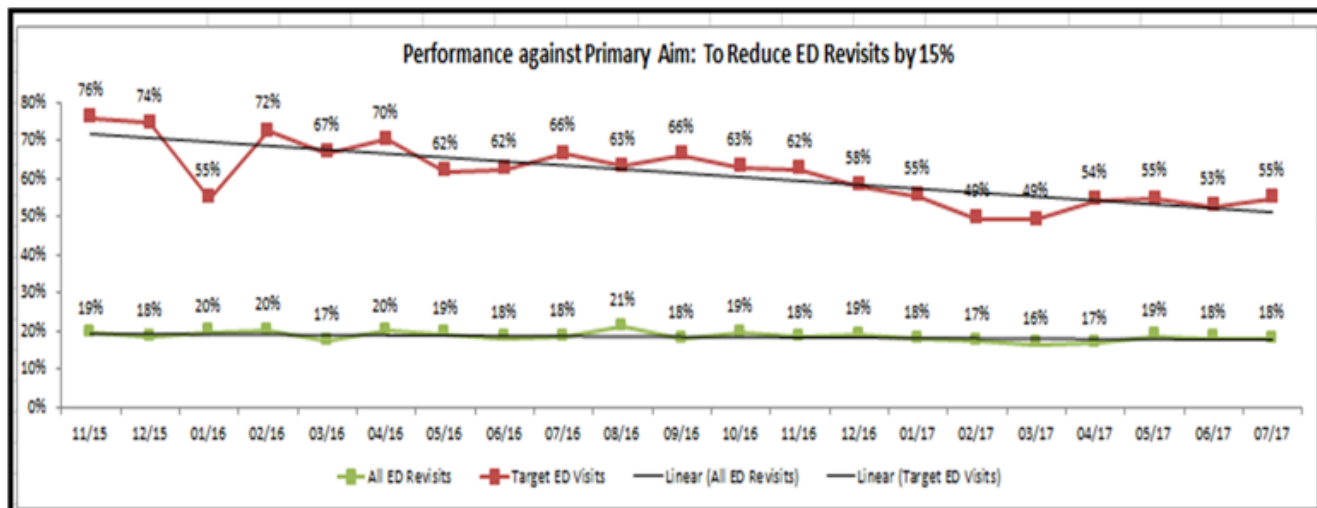
### Challenge

Patients with high utilization of the emergency department tend to have more complex medical, social and behavioral health needs than the general population. This combination of characteristics can lead ED teams to spend significant time and resources managing these patients only to see them return. Baystate Noble Hospital set a goal to reduce 30-day readmissions by 25 percent among patients with high ED utilization and was awarded \$1.2 million in support from the CHART Program to implement a program. Baystate Noble defined their intervention population as patients who had had four or more inpatient admissions or 10 or more ED visits in the past year.

### Action

Baystate Noble began by assembling a Complex Care Team (CCT) that would identify and provide ongoing services and support to patients in the intervention population while they were in the ED, during an admission, and following discharge. The CCT was comprised of two nurses, two social workers and a full-time mental health clinician. Many of Noble's intervention patients had both chronic medical and behavioral health diagnoses, so having a mental health professional on the team was essential. The team assessed eligible patients, developed individualized care plans (ICP), coordinated medication optimization, and made referrals to community and behavioral health services, as needed. In the inpatient setting, the CCT participates in multidisciplinary complex care rounds, develops or modifies the ICP, coordinates services, including palliative care, and facilitates warm handoffs to in-hospital services. Following discharge, the CCT provides an in-home follow up within 48 hours, provides a medication review and reconciliation, and engages in care navigation to ensure that all needs are met.

**Exhibit A:** Performance against Primary Aim: To reduce ED revisits by 15%



The CCT built close relationships with nearby service providers, including the Behavioral Health Network, the respite care provider, the local pharmacy, Adult Community Clinical Supports workers, and other clinicians that were involved in the care of their patients. These close relationships allowed for monthly care plan meetings where the team would review the patients' progress and identify needs. These relationships also helped facilitate easier placement of patients when they needed an inpatient bed or appointment or when they needed to be connected to additional services. CCT was able to coordinate with the local pharmacist to deliver medications to patients. This home delivery service helped patients maintain their medication compliance by lowering barriers to obtaining medications.

The full-time mental health clinician on the CCT served as a liaison to the crisis mental health clinician who was on contract through the Behavioral Health Network. The CCT clinician also provided mental health support to patients when they were on-site for an ED visit, if they were boarding while waiting for a placement, or if they were admitted to the hospital.

In addition to providing care to patients while they were in the hospital, the CCT regularly reached out to their patients, either by phone or through home visits. Frequent phone calls to the patients helped identify barriers to care before they became urgent and made patients feel that they had supports in place should they need them. Home visits helped to bridge patients with counseling or medication checks to make sure they were getting the treatment they needed between appointments. Members of the CCT also accompanied patients to doctor's appointments, which helped improve communication between the patients and their primary care physicians.

## Outcomes

Ultimately, Baystate Noble was successful in achieving their target reduction in ED revisits among this very vulnerable population. After the CHART grant funds terminated, the hospital invested in hiring a full-time mental health clinician on the medical floors as well as a transitional care coordinator in the ED to help manage this population of patients in the ED. The transitional care coordinator is an integral member of the ED team who is able to meet with patients right away and to help connect patients to services, review teaching with patients and ensures that these patients get what they need.

### What is CHART?

The project described in this case study was supported by a Community Hospital Acceleration, Revitalization and Transformation (CHART) Investment from the Commonwealth of Massachusetts Health Policy Commission (HPC). The CHART program made innovative investments in the Commonwealth's community hospitals with the goal of establishing a foundation for sustainable care delivery. CHART funds enabled the hospitals to develop new care models designed to help patients avoid costly acute care settings like the emergency department by assessing local needs, modifying services, and expanding relationships with medical, social, and behavioral health community organizations.

# Wellness team helps reduce stress and fatigue, promotes mindfulness for physicians and staff

## BERKSHIRE HEALTH SYSTEMS

Berkshire Health Systems (BHS) is a full continuum community health system in Western Massachusetts. The system includes two hospitals, Berkshire Medical Center and Fairview, each with their own Emergency Department (ED) as well as a Satellite Emergency Facility in North Adams. The BHS Wellness team serves BHS' roughly 5,000 employees with over 200 programs throughout the year. This includes annual screenings, health risk assessments, and debriefing after adverse events, as well as workshops on nutrition, exercise, and other wellness topics.

### Challenge

In 2012, BHS identified burnout, compassion fatigue and secondary stress as significant work health issues. They sought a solution that focused on mindfulness and met staff where they were in terms of workflow.

### Action

After a randomized trial using Kripalu Yoga-Meditation showed promising results, BHS implemented a 10-week mind, body, spirit program called Effort and Ease. The program was first offered to physicians, chief nurses, and senior leaders at the hospitals. Since then over 200 staff members, including ED staff, have participated in the weekly 90-minute classes aimed at building resiliency. Classes include writing and didactic learning as well as meditation, breathwork, and yoga stretching practices. Participants are also given tools to reduce stress they can implement in their workday and at home. Effort and Ease is taught by a member of the Wellness team who is both a Kripalu Yoga instructor and a licensed mental health counselor.

The Wellness team at BHS also recognizes that providers' busy schedules often prevent them from seeking out self-care programming. That's why staff is taught to find

quick and simple ways to practice mindfulness. Whether that is utilizing time staff takes to wash their hands or walking through a doorframe mindfully, staff are encouraged to take a deep breath, roll their shoulders and reset their minds for the next task at hand.

The Wellness team also comes out to the units. They set up a relaxation station in the break room with stress management cards, hot tea, and soothing music. A mindfulness coordinator also visits break rooms to walk staff through a quick three-minute breathwork exercise. Another way the Wellness team works to incorporate wellness into staff members' workflow is to partner with managers to bring workshops to staff meetings.

At a systems level, BHS has implemented a particularly innovative wellness policy. They have eliminated all soda and sugar sweetened beverages as well as artificially sweetened beverage in hospital cafeterias. There are now more filtered water stations and the cafeteria coolers are filled with healthier beverages.

### Keys to success

- Senior Leadership support: The primary reason wellness programming has been so successful is senior leadership's support of the mission and understanding of the need for this work.
- Wellness as a service: Another contributor to the Wellness team's success has been the ability to contract their services out to business in the community. This allows BHS to recoup some of their investments on staff.

# Strategy to reduce ED boarding of patients with behavioral health diagnoses

BETH ISRAEL DEACONESS HOSPITAL–MILTON

Beth Israel Deaconess Hospital–Milton 100-bed acute-care community hospital that serves Milton, Randolph, Quincy, Braintree, Canton, Dorchester, Mattapan, Hyde Park and other surrounding communities. The emergency department (ED) at BID–Milton serves 25,000 patients each year.

## Challenge

The emergency department leadership at BID–Milton knew they faced challenges managing behavioral health (BH) patients in the ED, but their “burning platform” moment, according to chief medical officer, Dr. Ashley Yeats, was a serious injury sustained by one of the nursing staff from an escalated behavioral health patient. This incident, along with data showing that 95 percent of their ED boarding was attributable to BH patients, helped galvanize the BID–Milton ED to redesign their approach to patients with behavioral health needs. They applied for and received a \$2 million CHART grant from the Health Policy Commission in 2015 and were on their way to redesigning their ED practices to better support BH patients.

## Action

While many of the factors that lead to boarding of behavioral health patients are outside the control of the emergency department – insurance barriers, limited inpatient beds, and closure of other facilities, to name a few – the BID–Milton team committed to doing what they could within their own walls to shorten their BH patients’ boarding time. At the outset, the team set an ambitious primary goal of reducing ED length-of-stay of long-stay (>8 hours) boarders for ED behavioral health patients by 40 percent.

The ED decided to invest in the creation of an ED Behavioral Health Care Integration (CI) Program, which included a Director of Care Integration, two co-located BH clinicians from the affiliated BH Emergency Services Provider (South Shore Mental Health), a part-time music therapist and chaplain, ED physician, RN, and security officer champions, a pharmacist, a certified peer specialist, and administrative and analytic support.

### What is CHART?

The project described in this case study was supported by a Community Hospital Acceleration, Revitalization and Transformation (CHART) Investment from the Commonwealth of Massachusetts Health Policy Commission (HPC). The CHART program made innovative investments in the Commonwealth’s community hospitals with the goal of establishing a foundation for sustainable care delivery. CHART funds enabled the hospitals to develop new care models designed to help patients avoid costly acute care settings like the emergency department by assessing local needs, modifying services, and expanding relationships with medical, social, and behavioral health community organizations.

The team focused on interventions that helped to address the patient’s immediate needs and reduce the risk of symptom escalation in the ED:

- Therapeutic interventions such as the use of a music therapist, faith counseling, and familial counseling to help the patient feel more relaxed and cared for.
- Medication monitoring by a pharmacist on the team who performs medication reconciliation and monitors the patients’ medications at the same level as they would for inpatients to ensure that BH patients were on the proper medications and dosages.

# Point-of-care testing helps to expedite care and reduce emergency department wait times

BETH ISRAEL DEACONESS HOSPITAL–NEEDHAM

Beth Israel Deaconess (BID) Hospital–Needham is a 58-bed community hospital in the suburbs of Boston. Their emergency department (ED) has 19 private rooms as well as a separate pediatric waiting room. The BID–Needham ED has a direct link to Beth Israel Deaconess Medical Center should patients need to be transferred for more advanced care. Annually, the ED at BID–Needham sees approximately 16,900 visits.

## Challenge

Like many hospital EDs, BI–Needham experiences crowding and is always looking for opportunities to reduce patient wait times.

## Action

About five years ago, the ED decided to implement point-of-care testing in order to expedite testing and reduce wait times for patients. An ED technician, under supervision of the central lab, is able to run the following tests:

- Chemistry panel
- Basic hematocrit
- Lactate
- INR
- Urine pregnancy tests

Providers can receive results in as quickly as 60 seconds as opposed to 20-30 minutes if sent to the hospital's central lab. This allows providers to quickly create treatment and disposition plans.

In addition to the initial setup and certification challenges one would expect, the BID–Needham team needed to ensure that these point-of-care tests were just as accurate as traditional lab orders, thus helping the rest of the hospital buy in to the use of point-of-care labs in the ED. This requires rigorous quality control and cross checking with traditional lab orders to demonstrate their accuracy. The ED also keeps a list of rare medication/lab interactions that can affect results. Another challenge was that providers would order both point-of-care testing and central lab testing, thus duplicating work and costs. Staff had to be educated to only order from one source unless there was a reason for concern.

This process was developed in coordination with the central lab and their leadership, and operates under the lab's CLIA license. As Dr. Peter Smulowitz explains, the stakeholders started this project with the question, "What's the right thing for my patients?" rather than, "What's the right thing for my department?" and have been able to avoid the usual conflicts over turf. This close collaboration between the ED and the Central Lab has facilitated rapid and safe testing that leads to more timely patient care.

### What is point-of-care testing?

Point-of care-testing is the rapid analysis of lab tests within the care setting instead of sending them to a central lab. Point of care testing allows for timelier patient care.

# Governance structure helps manage EHR change

BETH ISRAEL LAHEY HEALTH

Beth Israel Lahey Health System is a large integrated health care delivery system that includes 13 hospitals, over 4,000 physicians and 35,000 employees. Among the hospitals in the recently merged system are three Beth Israel community hospitals located in Milton, Needham and Plymouth.

## Challenge

Inefficient electronic health records (EHR) processes can contribute to the cognitive burden that clinicians face as they navigate patient records and initiate orders for everything from diagnostic tests or medications to inpatient admissions. This burden is felt more acutely when a clinician has to adjust to different electronic platforms in different clinical settings.

## Action

The Beth Israel Deaconess (BI) community hospitals, located in Milton, Needham and Plymouth, tackled this challenge by adopting a unified EHR platform across all three sites, allowing clinicians to interact with the same EHR environment in all clinical sites. They have also set up a common EHR governance structure that helps to monitor implementation and functionality of the EHR system as well as receive feedback from frontline providers.

In October 2018, the three Beth Israel community hospitals – BI Milton, BI Needham and BI Plymouth – went live with an upgraded EHR that brought a common platform to the three hospitals. The implementation of a new MEDITECH EHR was the culmination of a collaborative, multi-year, multidisciplinary effort that sought to prioritize certain EHR enhancements as well as to bring standardization to key clinical workflows. In addition to upgraded functionality, the unified platform brought a standardized electronic environment for clinicians who practice in all three hospitals, reducing the cognitive burden associated with working at different clinical sites.

Now that the team is several months beyond go-live, they plan will utilize an interdisciplinary Clinical Informatics Committee (CIC) to provide ongoing oversight to the EHR. According to the CIC charter, the group will include representatives from all three hospitals and will include medical administration, nursing administration, nursing leadership, quality, pharmacy IT clinical analysts, clinical representatives, health information management, legal and compliance. The CIC is charged with “developing strategic plans; establishing clinical IT priorities, policies and procedures; and identifying improvement opportunities through the appropriate use of clinical informatics.” Their duties will include implementation of order sets, review and approve clinical decision support tools, monitor satisfaction with the EHR and develop a process to standardize clinical content for the three community hospitals.

## Lessons learned

- **Engage with clinical end-users upfront.** Having good end-user representation along with leadership from the start helps and keeping the focus on end-users and their experience is key to success.
- **Set up a good governance structure.** Having a clear governance structure to vet decisions appropriately is important. It gives clear avenues for input into the process and allows for the right players to be at the table.
- **Level-set expectations.** Culture and change management need to be top priorities. Barriers tend to be cultural and psychological instead of technical, so it's important to shape expectations of what the product will be on day one.



# Hospitals use specialized team, including pharmacists, to promote post-discharge care coordination

BETH ISRAEL-LAHEY HEALTH SYSTEM

Addison Gilbert Hospital in Gloucester and Beverly Hospital in Beverly are two community hospitals within the Beth Israel-Lahey Health System. Together, the hospitals partnered on a CHART investment to explore opportunities to reduce preventable readmissions among patients with complex health care needs.

## Challenge

Patients with a high degree of social complexity require more time and support from emergency department (ED) staff compared to the average ED patient. These patients may also be more likely to revisit the ED, especially if their care outside of the hospital is not well-coordinated.

## Action

In 2016, Addison Gilbert and Beverly Hospitals each received a CHART grant to develop and implement a strategy to manage socially complex patients with the goal of reducing 30-day returns by 20 percent. The hospitals secured \$3.77 million in CHART funding to support this intervention. The team defined their target population as any patient who had been hospitalized more than four times in the past year, had a readmission to the hospital within 30 days of a previous visit or were socially complex. Socially complex patients generally included those patients with a substance use disorder, patients experiencing homelessness, those with a disability, and patients who were dually eligible for Medicare and Medicaid. They also had a number of patients who needed end-of-life care and palliative consultation. By the program's definition, approximately 35 percent of all discharges qualified to participate in the program.

The program was built around a High Risk Intervention Team (HRIT), which provided wraparound services and support to eligible patients. During the grant period, the HRIT consisted of a nurse practitioner, two registered nurses, a pharmacist, and two social workers. Patients who were eligible for the program were enrolled and received an ED care plan developed by a social worker. Care plans varied depending on patient needs, but focused on ensuring that the patient had access to and was taking the correct medications; that they were receiving the follow-up appointments they needed; and that their social needs, for example, housing or food, were being met. The care plans were developed by an HRIT social worker or case manager, and were then reviewed and approved by someone on the medical team.

## What is CHART?

The project described in this case study was supported by a Community Hospital Acceleration, Revitalization and Transformation (CHART) Investment from the Commonwealth of Massachusetts Health Policy Commission (HPC). The CHART program made innovative investments in the Commonwealth's community hospitals with the goal of establishing a foundation for sustainable care delivery. CHART funds enabled the hospitals to develop new care models designed to help patients avoid costly acute care settings like the emergency department by assessing local needs, modifying services, and expanding relationships with medical, social, and behavioral health community organizations.

The HRIT worked hard to develop strong relationships with both the patients and partners in the community, including skilled nursing facilities, behavioral health providers, visiting nurses and primary care practices. Once the care plan was established, social workers would follow-up with patients at home visits to make sure that they were able to follow the plan. Social workers coordinated with others who the patient was regularly seeing, such as visiting nurses, or the patient's primary care physician. Pharmacists also performed specialized home visits to check on the patients' adherence to their medication regimen and helped to trouble-shoot if the patient had a difficult time with any aspects of obtaining or taking their medication. Pharmacists were also able to perform medication reconciliation in the home to make sure that patients were on the correct medications and that they understood how to take them properly.

Ultimately, the team was successful in reducing ED revisits among the patients enrolled in the program. The team was so successful that the hospitals decided to maintain the HRIT, but program staffing has been optimized since the grant funding came to an end in 2018. Now, the team at Addison Gilbert includes a pharmacist and a social worker and the Beverly team includes a pharmacist and three social workers. The hospitals share a recovery coach who provides specialized support to patients in recovery. Funding for the program is provided by both hospitals as well as through some billing for outpatient psychotherapy done by the social workers.

## Lessons Learned

- Social workers form the backbone of the team and serve a key role in coordinating with other care providers, helping patients stay on-track and addressing the patients' social needs.
- Using the PreManage ED solution allows a hospital to get a better understanding of a patient's recent ED visits, even if the visits took place at different hospitals. It is especially helpful if other hospitals have taken the time to input basic notes about the patient's care plan.



# Checklists improve success rates for high-risk, low-frequency procedures in the emergency department

BOSTON CHILDREN'S HOSPITAL

Boston Children's Hospital (BCH) is a freestanding, quaternary-care children's hospital with approximately 400 inpatient beds and 60,000 annual emergency department (ED) visits. The ED treats patients who walk in or are brought by ambulance from the surrounding communities, as well as patients referred in from other hospitals in Massachusetts, New England and farther locales.

## Challenge

Emergency department teams must be prepared for anything, but procedures that are performed rarely can be challenging to execute properly without practice. Checklists and simulation for high-risk, low-frequency procedures can help improve success rates and avoid errors.

## Action

The ED at Boston Children's Hospital, one of the top pediatric care centers in the nation, has implemented a series of checklists to guide clinicians through procedures that may need to be done in the ED. Checklists can help physicians walk through the most important steps of a procedure. Recognizing that critical care procedures are frequently performed in a pressurized situation, the BCH checklists are designed to make staff think about equipment, personnel and patient factors that could make a procedure more difficult.

BCH physicians have been using a checklist for intubations routinely for about five years. The laminated checklist has brightly colored illustrations and is available with intubation equipment in each resuscitation room. Before the procedure begins, an ED staff member reads the checklist out loud to the care team to ensure all bases are covered. After the procedure, provider completes a brief data form about the intubation, if they used the checklist,

and if it was helpful or caught something they might have missed. This has allowed the ED to make improvements to the checklist and review with staff. For faculty and fellows, simulations on airway include the checklist so that its use becomes routine.

In 2014, in response to complications from placement, the ED team developed a chest tube checklist in simulation, which was then introduced into the clinical setting. The checklist accompanies the chest tube kits in the ED, so it is readily available for use. The checklist is double-sided with bullet points on the front and detailed instructions for teaching purposes on the back. Training in simulation with the checklist, including faculty, has led to a 50 percent reduction in complications.

In addition to the intubation and chest tube checklists, ED staff are trained in simulation with checklists for ultrasound-guided femoral central lines and intraosseous needle placement ("IO"). After simulation with the IO checklist, first pass success with IO placement has improved to over 80 percent. Each checklist is available in a departmental online library with videos and teaching references. BCH tracks critical care procedure complications as a quality indicator.

## Outcomes

- The chest tube checklist, combined with training in simulation with the checklist, has led to a 50 percent reduction in complications.
- With training and a checklist, successful first-pass placement of ultrasound-guided femoral central lines and intraosseous needles increased to over 80 percent.

# A creative use of space helps meet emergency department needs and expedite care

BOSTON CHILDREN'S HOSPITAL

One of the top pediatric care centers in the nation, Boston Children's Hospital (BCH) implemented fast track in the emergency department (ED) more than a decade ago.

## Challenge

But with 60,000 emergency department visits and 25,000 inpatient admissions every year, volume and boarding issues prompted the ED team to look for opportunities to adapt existing clinical space into additional fast track facilities.

## Action

Fast Track Extension (FTX) is a physically separate clinical space located in Pre-Op Admitting and is available to the ED from 3 p.m. to 1 a.m. on weekdays and 2 p.m. to 1 a.m. on weekends and holidays. The additional repurposed space allows ED to expand fast track capacity to six rooms with another team on shift, allowing low acuity patients to be seen and treated in approximately 90 minutes.

A triage nurse determines a patient's suitability for fast track, ESI level 4 or 5, and the clinic is staffed with a nurse, one to two pediatric-boarded urgent care physicians, a clinical assistant and a registration clerk. Providers have access to labs, radiology, EKG and patients are seen and discharged exclusively from FTX. A considerable volume of patients is treated in FTX, enabling the main ED to concentrate on more complex, higher-acuity cases.

Challenges related to operating an additional clinical space one floor away are mainly related to transport, but patients can be discharged directly from FTX on most days

## Outcomes

The clinic is so successful that the ED team recently identified another physical space for fast track to be used during the day in the hospital's Sleep Lab, as contingency plan during high volume surges. Also, during recent winter volume surges, pre-operative (pre-op) nursing administrators have been flexible and willing to facilitate a hybrid ED-pre-op patient space during weekday early afternoon hours.

### Tool for this project:

- Boston Children's Hospital Fast Track Triage Guidelines

# “Golden Ticket” dramatically improves discharge safety

BOSTON CHILDREN’S HOSPITAL

One of the top pediatric facilities in the nation, Boston Children’s Hospital (BCH) is a 404-bed comprehensive care center treating patients from birth through 21 years of age. BCH sees over 60,000 visits in the emergency department (ED) each year, 25,000 inpatient admissions and 200+ specialized clinical programs with 557,000 visits annually. In 2017, the hospital performed more than 26,500 surgical procedures and 214,000 radiological examinations.

## Challenge

Discharge is an important opportunity for care teams to convey information to patients and ensure that patients and their families understand important instructions about follow-up care. It is also a time to do a final check on vital signs as well as pending laboratory tests and orders. Having a clear procedure and responsibilities at discharge helps to ensure that patients and families get the information they need and that important safety checks are performed.

## Action

After a series of safety events in 2018 that might have been prevented with a better discharge process, ED staff at BCH rallied to develop and implement a comprehensive discharge process. The team first identified several goals for the new process including a need, prior to discharge, to complete the following tasks: (1) Review of recent vitals and pending lab results; (2) Standardized review of discharge instructions with the patient’s family, including an opportunity to ask questions; and (3) Team huddle to make sure that nothing was missed.

Over the course of a couple of months, the entire ED team collaborated on a process redesign and created a checklist to guide the new process. The team opted to use a paper form, which allowed for quick deployment and easy revisions before a form embedded in the EHR.

Referred to as the “Golden Ticket” because of the bright, highly-visible yellow paper it’s printed on, the checklist is now part of the care binder for every child who comes to the ED, and must be completed before the patient can be discharged.

The discharge checklist include the following steps:

- Physician reviews recent vitals, writes scripts, discusses discharge plan with family, develops discharge instructions, calls referring provider to close the loop around discharge plan
- Nurse obtains last set of vitals, reviews any pending orders
- Team huddles
  - Do we have vitals and are they normal?
  - Is the correct name on discharge papers and prescriptions?
  - Any pending orders missed? Ex. culture not in lab, tetanus not given
  - Any results pending from labs or tests?
- Physician and nurse sign “Golden Ticket” to acknowledge that they have reviewed discharge order and huddled
- Discharge information is given to patient and family and final inquiry that patient/family ‘has information they need to provide care at home.’ Staff encouraged to standardize discussions with, “Five Things To Know Before You Go,”(reference), which includes:
  - Diagnosis
  - What to do at home
  - Who to follow up with
  - When to come back to the hospital
  - Any other questions
- Family takes “Golden Ticket” to the checkout desk. If they do not have the ticket, the care team is called.

BCH employed several strategies to implement the new checklist and change the culture around discharge safety. Quality leaders held staff meetings and provided net learning module about discharge safety events and new process to all staff, who were required to acknowledge. Champions of the new process met with and surveyed staff to address barriers to usage and iteratively improve checklist. Within a week of releasing the new checklist, compliance jumped to 90 percent, a rate sustained for the last year.

## Outcomes

The ED has seen a dramatic improvement in the discharge process. Ongoing efforts focus on the nurse being the last point of contact for the patient and family to address final questions about care and medication administration at home. With competing demands in the ED, staff thought that huddles would slow people down, but data collected has shown that the process does not add time and that it has been effective in improving patient safety. In addition, family advocates have seen a noticeable improvement in discharge process.

To continually review and improve the process, the ED team established a multidisciplinary discharge committee with parent representatives. They track compliance on a weekly basis, including use of the Golden Ticket, major events related to discharge, vital sign review at discharge, prescription errors, and minor gaps in care, such as leaving with the wrong name on

- Compliance with the “Golden Ticket” process has been sustained at 90 percent
- 60 percent of patients in a recent satisfaction survey said the information they received at discharge was “very good.”

Balancing measures for return visits, length-of-stay are also monitored. The committee also surveys staff and families about the discharge process. One question on the Press Ganey survey for families asks if they have all the information needed to care for their child at home. Recent results indicated that 60 percent of respondents said that the information they received at discharge was very good. Future directions include simplification of discharge instruction face sheets and limited English proficiency efforts.

# Routine team huddles help improve communication and situational awareness

CAMBRIDGE HEALTH ALLIANCE

Cambridge Health Alliance (CHA) is a vibrant, innovative health system that serves Cambridge, Somerville, and Boston's metro-north region. CHA has three hospital emergency departments, located in Cambridge, Somerville and Everett.

## Challenge

When used routinely, team huddles have been shown to improve team culture, communication, and situational awareness. However, the challenge remains to integrate huddles into the busy workflow of an emergency department (ED) in a way that staff finds useful and appropriate.

## Action

Cambridge Hospital emergency department utilizes two types of team huddles – one that happens routinely at the start of each shift, and one that occurs on an as-needed basis when the ED needs to decompress. The shift-to-shift safety huddle involves nurses, nursing assistants, and sometimes providers, who get together for a brief huddle at the nurse's station prior to the start of the new shift. The huddle is led by the charge nurse and includes a brief overview of the ED's current state, including how many patients and boarders are in the ED at the time. In addition, they complete a safety review that highlights the current patient safety concerns, including patients at high-risk for falls, elopement or other risks. Finally, the team discusses any operational challenges that might impact the shift, including equipment that needs repair or supplies that are running short.

In addition, there are times, mid-shift, when the team needs to come together again to manage capacity challenges in the ED. Associate chief nursing officer, Danielle Bobek, calls it "running the board," and essentially, it's an ad-hoc huddle that pulls the ED team together to make a plan to decompress the ED. This huddle may be called by the charge nurse or an attending and involves a review of all the patients to identify what patients need to get closer to a disposition. They ask the questions, "Who's sick, who's not sick," and, "Who's waiting for what?" By looking at each patient individually to understand their needs, the team can plan and prioritize. It's a collaborative effort between providers and nurses to figure out how best to move forward. Once the team identifies their needs, they are able to redirect resources to address the needs.

## Keys to success

Overall, the shift-change huddle increases situational awareness and helps the team plan for a successful shift. Ultimately, says Bobek, the ED team "has to manage the chaos together," and the mid-shift huddles help them do this in a way that is both collaborative and effective.

# Emergency department implements split-flow process to help ease crowding

FROEDTERT HOSPITAL

## Challenge

When Froedtert & the Medical College of Wisconsin's emergency department ("ED") was planning to remodel in 2015, they were looking for out-of-the-box strategies that might also help them reduce the ED's discharge length-of-stay and the percentage of patients who leave without being seen.

## Action

A team member suggested that a split-flow strategy might work, and with a renovation underway, it would be easier to reconfigure the space to meet the needs of a split-flow process. With the support of hospital leadership and frontline ED staff, the ED was reconfigured to support a split-flow process, creating space for "vertical" patients – those patients who could stand or sit for evaluation – in addition to the space that already existed for "horizontal" patients, or those patients who needed to be evaluated in stretchers.

After a planning process that included a tabletop exercise to test the new design, the team landed on a final design that included a dedicated exam rooms and an adjacent Continuing Care Area that could accommodate up to 18 patients in chairs or recliners. At first, the team tried to implement a complex set of triage criteria based on chief complaint that nurses would use to determine a patient's eligibility for the vertical unit. When this proved too complicated, they developed a simpler, five-point decision algorithm (see inset for detail), that allows triage nurses to quickly determine whether patients are appropriate to be seen in the vertical unit.

## Hours and staffing

The ED's vertical unit runs daily from 9-1 a.m. As currently configured, the unit has 18 recliners in the Continuing Care Area and 12 exam rooms – 10 are used for patient exams and two are used for discharge and treatment. There are two faculty shifts in the vertical area during the

time it's open. Typically, there are 1-3 advanced practice providers on at a time (usually 2) and nurse staffing includes 1-2 nurses in the Continuing Care Area and additional nurses that are doing primary patient care in the vertical rooms

## Outcomes

In the first six months of implementation, the ED experienced a drop in discharge length of stay by 25 minutes and saw their percentage of patients who left without being seen drop from 3-5 percent down to 1-2 percent. When the vertical area is open, approximately 40 percent of ED patients are triaged to the vertical area.

## Lessons learned

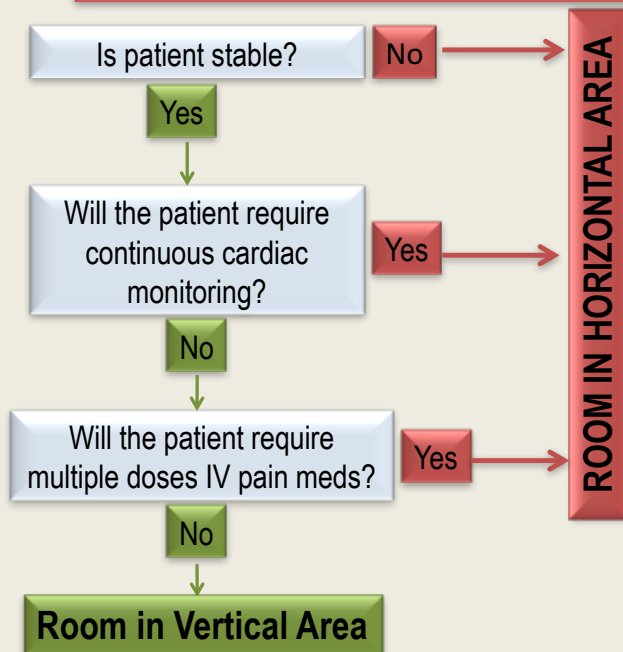
In the first six months of implementation, the ED experienced

- Space and design are key. Having the right physical space to accommodate a vertical area is essential. You don't necessarily have to do a major redesign, but you need the dedicated internal area (CCA) in order for vertical to work. If possible, try to design the rooms so they look different in vertical; this helps providers get into the right mindset to make vertical run well.
- Keep triage simple. Develop an easy-to-use triage tool to make it easy for the triage nurse to determine which patients are appropriate for the vertical area.

## Vertical Criteria for ESI 3's

### Ineligible for Vertical if:

- Intoxicated/Altered
- At risk for self harm
- Non-ambulatory at baseline
- Cannot sit in a chair
- Age > 60 + 1 of the following
  - Headache
  - Dizziness
  - Abdominal Pain
  - Shortness of Breath
  - Chest Pain





# Investing in high-touch care coordination to reduce emergency department revisits

HOLYOKE MEDICAL CENTER

Holyoke Medical Center (HMC) is a 198-bed facility with over 1,300 employees serving a population of over a half a million residents in western Massachusetts. In 2015, HMC received two grants from the Health Policy Commission. One, which amounted to \$1.9 million, supported HMC's efforts to measurably improve outcomes for behavioral health patients in the emergency department (ED). A second grant of \$2 million supported a capital project to build a Behavioral Health Unit within a new, larger emergency department.

## Challenge

Patients with behavioral health diagnoses wait three times longer than traditional ED patients for an inpatient bed, leading to extended periods of boarding, poorer outcomes for patients, and strains on ED operations.<sup>1</sup> They are also more likely to revisit the ED than other patients. As the number of patients seeking emergency care for behavioral health disorders increases,<sup>2</sup> the health care system, including EDs, must adapt to accommodate the needs of this growing patient population.

## Action

Holyoke Medical Center estimates that 67 percent of their medical population has a primary or secondary behavioral health diagnosis, and this population is becoming an ever-increasing share of all patients. With the goal of reducing 30-day ED revisits by 25 percent for patients with a behavioral health diagnosis, HMC deployed a behavioral health social work and assessment team in its ED to enhance care coordination, introduce targeted interventions to address patients' complex social issues, and increase information sharing across care providers.

The CHART grant made it possible to augment the existing behavioral health team in the ED for a total of 14 FTEs, including an advanced practice nurse (APRN) to manage medications, a medical doctor with a buprenorphine waiver who would help manage the patient's medical condition, four community health workers who served as patient navigators, one medical assistant, and three ED nurses. Importantly, the team's APRN was a psychiatric prescriber, meaning that she could offer "bridge" appointments to patients who were unable to get a timely appointment for psychiatric care but needed medication refills and monitoring to ensure full compliance with their treatment plan.

### What is CHART?

The project described in this case study was supported by a Community Hospital Acceleration, Revitalization and Transformation (CHART) Investment from the Commonwealth of Massachusetts Health Policy Commission (HPC). The CHART program made innovative investments in the Commonwealth's community hospitals with the goal of establishing a foundation for sustainable care delivery. CHART funds enabled the hospitals to develop new care models designed to help patients avoid costly acute care settings like the emergency department by assessing local needs, modifying services, and expanding relationships with medical, social, and behavioral health community organizations.

The team developed a flagging system in the electronic health record that would flag patients who entered the ED if they had been seen at HMC before and had a behavioral health diagnosis. The flag would trigger a visit from a member of the social work and assessment team, who would do a brief evaluation of the patient to

<sup>1</sup>Nicks, B.A. and Manthey, D.M. The impact of psychiatric patient boarding in emergency departments. *Emerg Med Int.* 2012; 2012: 360308. <sup>2</sup>Agency for Healthcare Research and Quality. *Chartbook on Care Coordination. Measures of Care Coordination: Preventable Emergency Department Visits.* May 2015. Rockville, MD: Agency for Healthcare Research and Quality. <http://www.ahrq.gov/research/findings/nhqrd/2014chartbooks/carecoordination/care-coord-measures2.html>. Accessed April 1, 2019.



determine what their needs were. From there, the team would develop a comprehensive care plan that included both follow-up for the patient's immediate health care needs as well as support the patient needed to meet basic needs such as food or housing. The care team also engaged the patient in a conversation about what they needed to avoid the ED and then made a plan to ensure that the patient got what they needed. In some cases, it was as simple as a regular phone call to check-in and help solve problems; in other cases, the patient navigators would visit patients at home to help them cope with difficult times. Post-discharge phone calls were made to all participants to identify any barriers to receiving follow-up care and to reinforce any discussions that happened while the patient was in the ED.

At the same time as HMC was pilot-testing this new process, the hospital also opened up the new emergency department in June 2017, which has a separate, specially-designed behavioral health pod. The new pod has six beds where behavioral health patients can be triaged and treated by a specialized behavioral health care team. The redesigned space helps decompress the ED by giving behavioral health patients their own area and was created with input from behavioral health patients.

## Outcomes

Over the course of the two-year grant, HMC was able to reduce 30-day revisits to the ED among their target population by 46.3 percent.<sup>4</sup> HMC has decided to maintain elements of the program as part of their MassHealth ACO offerings.

## Lessons learned

- Create care plans to facilitate coordination of treatment and services
- Reduce barriers by limiting the need for paperwork, appointment scheduling and diagnoses; focus instead on building relationships and trust
- Address social determinants of health and provide direct-care services to cover gaps
- Develop relationships with area service providers and when possible, use patient navigators to do warm handoffs

<sup>3</sup>Analysis from the Health Policy Commission, 2017.

# Paramedics help improve flow in emergency department

LOWELL GENERAL HOSPITAL

The emergency departments at Lowell General Hospital's Main and Saints Campuses have emergency medicine and surgical specialists available around-the-clock to care for patients experiencing serious acute illness and traumatic injuries.

## Challenge

The emergency department (ED) at Lowell General Hospital struggled with the recurrent problem of patient flow during the 3-11 evening shift, when the patient arrival volume increases at the same time as many of the admitted ED patients are going upstairs to their inpatient beds. On an average day, Lowell General admits about 40 patients from the ED to the hospital's inpatient units. Roughly half of these patients require telemetry, which must be monitored continuously by a skilled member of the medical team as the patient transitions to the inpatient unit. As these telemetry patients moved upstairs, they would need to be accompanied by a nurse to complete the transfer to inpatient. The ED staff estimates that this process, on average, would take about 30 minutes per patient, leading to a significant investment of time for the nurses on that shift. At the same time, it would pull them away from other tasks, including triaging and processing new patients arriving at the ED.

## Action

Recognizing the burden on nurses and the impact on patient flow, the ED leadership brainstormed solutions to this daily challenge that would enable them to free up nurses while maintaining patient safety. They decided to pilot a strategy of adding one EMT-paramedic to the 3-11 shift four days a week, replacing one tech position in the ED. The EMT-paramedic would be primarily responsible for escorting the admitted patients with telemetry upstairs. Since EMT-paramedics are trained to monitor telemetry, they are able to assist nurses in this responsibility. In addition to performing this task,

paramedics are also capable of helping with procedures, starting IVs, performing EKGs and helping with airway management, along with other tasks as needed to help the clinical team manage patients. Since the paramedics do not have specific patients assigned to them, they are able to float and can be called in to help on an as-needed basis.

In order to staff these positions, Lowell General has been able to draw on its own pool of hospital-trained EMT-paramedics, who are already hospital employees and are under the medical direction of the hospital. These EMT-paramedics staff the hospital's Advanced Life Support (ALS) ambulance crews that provide emergency medical services along with local first responders to the City of Lowell and the towns of Chelmsford, Dracut, Dunstable, Tewksbury, Tyngsborough and Westford. The ED shifts offer Lowell's EMT-paramedics the opportunity to increase their earnings while also getting the working in a different clinical environment. In addition to providing needed support to the ED team, introducing the EMT-paramedic into the ED has helped improve collaboration and communication between the ED and the ALS ambulance units, since the EMT-paramedics have a view of both worlds.

## Outcomes

The pilot in 2018 demonstrated the effectiveness of the program. The Lowell General team acknowledges that the cost of having an EMT-paramedic on-staff instead of a traditional tech is higher, but they feel that the nursing-time saved more than makes up for the difference in cost. Since the paramedics are already trained by the hospital, the only additional training they need to step into the ED is a typical orientation to the ED processes. As a next step, the ED team is now looking to expand the EMT-paramedic coverage to be five days a week and to include some coverage on the weekends and overnights as well.

# Rapid Medical Evaluation program reduces length of emergency department stay

## LOWELL GENERAL HOSPITAL

Lowell struggled for several years with implementation of a fast track program that worked well for their Main Campus ED, which sees 60,000 visits for emergency services each year.

### Challenge

For several years, they had a traditional fast track program, which separated the low-acuity patients out and tried to get them on their way faster than more complex patients who needed more time with providers. Despite implementing fast track, the ED continued to have capacity issues and so the ED team decided that they needed to consider other strategies to help improve patient flow.

### Action

About four years ago, the ED leadership team collectively decided to implement a Rapid Medical Evaluation (RME) program in the ED to help manage patient flow by having a provider available at triage to assess and treat low-acuity patients. At first, the RME program was not very effective. It was poorly organized, lacked clear guidelines and did not have a dedicated team or space. The ED staff didn't like it and initially it created flow problems rather than helping to solve them.

In response to these challenges, the team worked to make adjustments to the RME program in 2017 to add structure and improve its operational efficiency, which has led to better outcomes. One challenge initially was that RME was not a regular, every day program and so providers would be pulled from their shift to work the program. The ED team changed that structure, making it a program that operates on a predictable, daily schedule and with a dedicated two-person team including a mid-level provider (NP or PA) and a tech.

The tech position is critical, because s/he is responsible for a number of activities, including moving patients around the RME space, getting specimens, and assisting with splinting. In addition, the ED created a dedicated space for the RME team to operate that includes 6 beds. Finally, the ED established and implemented clear, very strict patient eligibility guidelines to help determine who was appropriate to be seen in RME. This meant excluding patients who needed anything else that is too involved, such as sutures or procedures, so it was "only the quickest of the quick," according to Dr. Nathan MacDonald, the Chief of Emergency Medicine. To make sure they are maintaining fidelity to the processes set up, the team collects throughput data on all providers and analyzes it monthly.

### Outcomes and lessons learned

Since relaunching RME in March 2017, the ED team has seen marked improvements in several outcomes in the ED. The hospital has been able to document a decrease in ED length of stay for RME and traditional ED patients as well as a reduction in the number of patients who leave without being seen. Not surprisingly, patient satisfaction scores have improved, and the better flow makes for a happier ED staff as well.

In order to achieve these successes, the ED had to get some limited buy-in from other departments in order to change some physical aspects of the ED and also to alter the registration process. For RME patients, registration needed to be expedited, because the patient would be expected to spend less time in the ED. Overall, though, most of the project required changes within the ED itself and required engagement with ED staff.

# Home Hospital Program helps reduce ED crowding and improves the patient experience

MASSACHUSETTS GENERAL HOSPITAL

The Massachusetts General Hospital (MGH) emergency department (ED) is a Level I Trauma Center, Level I Pediatric Trauma Center and a Level I Burn Center that provides emergency medical care to over 100,000 patients each year.

## Challenge

One known contributing factor to ED crowding is the limited number of available beds in inpatient units. Aggressive bed management along with the use of alternative spaces to ED boarding while beds become available that are safe and effective could alleviate moments of high crowding.

## Background

Hospital at Home programs have been popular outside of the United States for decades, achieving widespread use and acceptance in Canada, England, Australia and Israel. In the U.S., the spread has been less rapid, but is gaining some momentum since first being adopted in the mid-1990s by Johns Hopkins Medicine in Baltimore.

## Action

MGH and Brigham and Women's Hospital (BWH) began piloting the Home Hospital Program in 2017 as a collaborative effort among many units in Partners HealthCare including population health, the department of emergency medicine and the department of medicine. Together, these units worked to develop the program's process and clinical guidelines.

Most patients who are eligible for the program come through the ED and have conditions that require inpatient-level care but are stable enough to have care provided to them at home. At MGH, when an emergency provider identifies a patient who may be a good candidate for the Home Hospital Program, he or she pages an Alternative Pathway Navigator (APN). The APN is a physician assistant or nurse practitioner who is trained to clinically review the patient's chart and screen for suitability based on the program guidelines. If eligible, the APN then consents the patient and family members to receive care at home; coordinates with specialty services that the patient might need; and helps arrange a warm hand-off to the home with the program's clinical team.

Patients admitted to the Home Hospital Program are seen by a nurse two times a day and by MGH clinical staff, including an advanced practice provider who sees the patient once a day and a supervising physician who sees the patient in the first 24 hours that the patient is at home. Though the program is open to all adult patients, the average patient is around 70 years old. The most common conditions that bring a patient into the program are congestive heart failure, cellulitis, pneumonia, and urinary tract infections. The daily census for the program can vary depending on where the patients are located and how time intensive it is for the care team to visit every patient on the daily schedule.

<sup>1</sup>Klein S. "Hospital at Home" Programs Improve Outcomes, Lower Costs but Face Resistance from Providers and Payers. The Commonwealth Fund. Available: <https://www.commonwealthfund.org/publications/newsletter-article/hospital-home-programs-improve-outcomes-lower-costs-face-resistance>.

## Outcome

Though logistics can sometimes be challenging, outcomes of the program so far are encouraging. Patients in the Home Hospital Program have an average length of stay of four days. It also helps patients avoid the safety risks associated with staying in the hospital, such as healthcare-acquired infections and delirium. For the hospital, the program saves an inpatient bed and can reduce ED crowding due to boarding of patients waiting for an inpatient bed. Finally, it gives providers a window into the social experiences of the patients they care for, allowing them to observe the home environment, family interactions and even the meals that patients are eating at home. All of this can offer vital insight into the social determinants that impact a patient's ability to be well.

### What is Hospital at Home?

Hospital at Home Programs offer an alternative to traditional inpatient hospitalization for patients who are sick enough to be admitted to the hospital, but stable enough to be treated at home. The programs allow patients to receive care in the home setting, avoiding high-cost inpatient care, reducing the risk of healthcare-acquired infections and improving the patient experience.

# Using a “Capacity Physician” to find creative, collaborative solutions to overcrowding

MASSACHUSETTS GENERAL HOSPITAL

The Massachusetts General Hospital (MGH) emergency department (ED) is a busy Level 1 Trauma Center located in downtown Boston that sees over 100,000 patient visits each year.

## Challenge

One known contributing factor to ED crowding is the limited number of available beds in inpatient units. Aggressive bed management along with the use of alternative spaces to ED boarding while beds become available that are safe and effective could alleviate moments of high crowding.

## Action

The Capacity Physician model can be described as an aggressive, centralized bed management system with an experienced physician at the helm. Dr. Peter Dunn is an anesthesiologist at MGH who has spent years grappling with the challenges associated with limited hospital capacity and high patient demand. These many years helped to prepare Dr. Dunn, in early 2018, to assume the newly created role of “Capacity Physician” at MGH. As MGH’s Capacity Physician, Dunn is empowered to perform two vital tasks for an overburdened hospital. First, he must create an environment among his peers in the hospital that helps everyone “get to yes” when it comes to accommodating patients who need to be cared for at MGH even when beds might be tight. Second, he takes a systems approach to analyzing the hospital’s capacity challenges, and proposes systems solutions that can alleviate recurrent capacity issues.

The Capacity Physician role is inherently collaborative in nature and requires a physician-leader who is flexible, creative and not prone to the tribalism that sometimes

comes with identifying too intensely with a given clinical specialty. At MGH, the Capacity Physician shares leadership with the nursing and admitting leadership, who are key partners in helping solve the daily challenges such as finding space for a complicated outside hospital transfer patient or managing the dynamic intra-hospital patient flow among the many units. In order to do the job well, the Capacity Physician must be a seasoned physician who has an expansive network of colleagues within the hospital and a good record of collaboration across departments. Often, the solution to a difficult capacity problem will require several departments to flex in order to accommodate a patient’s special needs. The Capacity Physician must have the ability to imagine a solution to the problem and the clout and relationships to see it through.

## Keys to success

To be successful, the Capacity Physician must also have the support of leadership at the highest levels. Since the job may ultimately involve reallocating vital hospital resources such as beds and space, the Capacity Physician must have the trust of leadership and the ability to make tough calls. For example, MGH just began the rollout of a bed-reallocation initiative throughout the hospital system, which led to beds being reallocated between services based on computer simulation models of ideal patient load. Though sometimes difficult, the work is essential as the hospital continues to face an ever-growing demand for its services. “The real issue is culture change,” said Dr. Dunn. “There needs to be an awareness that capacity management is everyone’s responsibility and everyone’s opportunity to contribute to high quality, efficient patient care.”



# Using a Full-Capacity Protocol to allow inpatient floor boarding in times of peak ED capacity

MASSACHUSETTS GENERAL HOSPITAL

The Massachusetts General Hospital (MGH) emergency department (ED) is a Level I Trauma Center, Level I Pediatric Trauma Center and a Level I Burn Center that provides emergency medical care to over 100,000 patients each year.

## Challenge

Located in the heart of downtown Boston, the MGH ED reaches or exceeds its bedded capacity on a daily basis, leading to crowding, longer ED wait times and delays in care. Over the years, hospital leadership has implemented a number of strategies to try to improve patient flow and alleviate crowding, including the creation of a fast-track service for low-acuity patients, aggressive bed management, and a robust Code Help Protocol.

## Action

Even with all of these strategies in place, the ED sometimes reaches levels that trigger a “Capacity Disaster,” which happens when the hospital’s Capacity Committee decides that the ED quickly needs to decompress. When this occurs, the hospital is able to activate its Full-Capacity Protocol, which triggers the creation of a Capacity Command Center that includes leadership from admitting, emergency medicine, case management, perioperative services and nursing as well as the medical officer of the day. When the protocol is implemented, the hospital stops accepting most transfer patients and is able to tap auxiliary space on the inpatient floors to board admitted ED patients until inpatient beds open up. The Command Center is run by admitting, which will identify locations for the ED boarders on inpatient floors. ED clinical leadership helps to identify patients by urgency and acuity who are good candidates to go to the inpatient floors. The inpatient and nursing leadership is best aware of the space available in auxiliary areas and can help target the most clinically appropriate patients to those spots.

In practice, the Full-Capacity Protocol allows admitted patients to be moved from where they are waiting in the ED to a space in one of the inpatient units. The inpatient locations that are opened up during this time include auxiliary rooms, such as conference rooms, solariums and break rooms, as well as hallways where it would be

safe to temporarily care for patients. Transforming these auxiliary spaces into treatment rooms often requires a privacy curtain, a nurse call button and a doorway that is wide enough to accommodate a stretcher. So far, MGH has identified one space per floor in 11 nursing units and will soon be adding two from cardiology, two from oncology and four from surgery. Each floor has discretion to manage the additional patient as they see fit. In some cases the boarded ED patient may be the best candidate for the hallway, but in other cases a patient who is already on the floor but is stable and ready for discharge might be the better candidate for the auxiliary location. It’s also important to note that not all patients are eligible for hallway boarding under the protocol due to safety concerns. Patients are not considered appropriate for hallway boarding if they require any special precautions or ongoing telemetry monitoring.

## Keys to success

The MGH team identified several keys to success that make this protocol possible. First, strong senior level nursing support and buy-in is critical. The biggest clinical impact of adding a patient to the floor is on the bedside nursing team. Second, it is important to leave the hallway decision to local leadership on the floor because they are best able to assess their patients’ needs and make sure that all patients continue to receive optimal care. Finally, it is important to be transparent with patients about the situation so they know why they are in the hallway and that they know they can speak up if they experience changes in their condition.

In the past two to three months alone, MGH has put the Full-Capacity Protocol in place 16 times, demonstrating an ongoing need to implement extreme measures on a regular basis. Over a hundred patients have been affected by the protocol and they have not had a single safety event in this time. In addition, almost all of the patients who experienced inpatient hallway boarding have gotten beds by the end of the day, which is not typically the case if they were to remain in the ED. According to Robert Seger, “The Full-Capacity Protocol gives us a tool to rapidly decompress the ED in times of severe overcrowding.” During these times the ability to move nearly 20 patients out of the ED to create capacity is incredibly valuable.



# Implementing a discharge time-out for improved safety and patient satisfaction

ST. ANNE’S HOSPITAL

## Challenge

St. Anne’s Hospital is a 211-bed-acute care hospital located in Fall River. In early 2018, the hospital’s Unit Base Council decided that they needed to make their discharge process more effective for patients returning home after a hospital stay, because patients were leaving the hospital without having absorbed important information about follow-up care. To address this challenge, the council decided to implement a Discharge Time-Out process to ensure that nurses had protected time to relay key information to patients prior to discharge.

## Action

The team started by identifying a discharge tool to help structure the discharge conversation and ultimately decided to use the Nurses Improving Care for Healthsystem Elders (“NICHE”) tool (see Fig. 1), which

covers the key questions that must be answered prior to discharge. This includes a summary of what happened during the patient’s hospital stay, a discussion of any follow-up appointments, instructions on any special care at home, a review of medications and needed supplies, and finally, contact information if the patient has any questions.

Once the patient is cleared for discharge and the instructions have been prepared, the nurse does two things to ensure that the discharge conversation with the patient is not interrupted. First, the nurse posts a “do not disturb” sign on the patient’s door to eliminate or at least minimize traffic in and out of the patient’s room during this time. Second, the nurse gives their portable phone to the Health Unit Coordinator to ensure that the nurse is not interrupted while giving discharge instructions.

Figure 1: NICHE Need to Know Discharge Tool

What?	What was done during the hospital stay? (Procedures, tests, results, etc.)
Appointments?	Date when you need to see the doctor and or specialist.
How to?	How to perform a medical task (Changing bandages, giving medication, etc.)
Instructions?	Written directions on what to do when you get home (Special diet, bathroom safety, etc.)
Contact?	Call back number with the name of the unit or hospital if you have questions.
Medications?	Medications on the discharge paperwork match home medications, new medications or scripts that need to be filled.
Supplies?	Any needed equipment or supplies?

## Outcomes

The initial pilot phase of the Discharge Time-Out process was first tested in the St. Mary's 25-bed medical-surgical unit and then expanded to include St. Theresa, the 26-bed inpatient surgical unit. It has now been expanded to include all inpatient discharges and they are considering a similar process for admissions and when patients are transferred to give dedicated time for nursing handoff.

Data collected by the hospital shows 94 percent of nurses and 83 percent of patients found that the uninterrupted discharge timeout helpful. Patient satisfaction scores related to discharge improved for both units in most categories through the three-month post-intervention period. In particular, patients verbalized that it was helpful to have the one-on-one time with the nurse to ask questions.

## Lessons learned

- Patients with special challenges, such as limited cognition, low literacy levels, or multiple chronic conditions benefit from having family involvement in the discharge process.
- Compared to other patients, surgical patients were more likely to participate actively in the discharge process.
- Even though this process was designed for the inpatient setting, it would be useful in other settings where patients are discharged to home, including the emergency department.

# Electronic call system helps improve post-discharge care

STURDY MEMORIAL HOSPITAL

Sturdy Memorial Hospital is a 132-bed community hospital located in Attleboro. The Emergency Care Center at Sturdy sees over 50,000 patient visits each year.

## Challenge

Emergency Care Center staff at Sturdy Memorial Hospital used to spend hours on the phone with patients following up on discharge orders. They found that many patients didn't fully understand or adhere to their orders, resulting in return visits to the emergency department (ED).

## Action

To improve discharge communications with patients, a multidisciplinary ED team researched and partnered with a company to develop an electronic tool for post-discharge calls. Sturdy Memorial now uses CipherHealth, which contacts patients via a call or text 48 hours after they leave the ED. Available in both English and Spanish, the system asks each patient five questions. Based on responses, a nurse or provider will call the patient back if they need additional help.

Monthly, only eight percent of calls require a call back. Sturdy Memorial splits the management of the call-backs to one of four nurses per day, so one person is not making calls five days a week. Questions are customizable and the ED team changes the survey every few months, while always gathering input on whether a patient has questions about discharge or prescriptions and if they are feeling better, worse, or the same. Sturdy Memorial also receives customized reports on the discharge process, allowing the ED team to track and address issues and continually improve care and the patient experience.

## Outcome

The number of revisits to the ED has decreased and the system is extremely cost effective, saving the hospital from having to hire extra staff to make the calls.

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*To improve discharge communications with patients, a multidisciplinary ED team researched and partnered with a company to develop an electronic tool for post-discharge calls.*

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# Eliminating interruptions to improve emergency care

## STURDY MEMORIAL HOSPITAL

Sturdy Memorial Hospital is a 132-bed community hospital located in Attleboro. The emergency care center at Sturdy sees over 50,000 patient visits each year.

### Challenge

Studies of emergency department (ED) clinicians show that their work is interrupted anywhere from five to 15 times per hour during a given clinical shift. Interruptions may take the form of face-to-face interactions with colleagues or urgent pager, text or EHR messages that must be addressed. Such interruptions can make it difficult to maintain focus on any one task, and can lead to errors when tasks are not completed, completed while task-switching, or rushed to make up for the interruption.

At Sturdy Memorial Hospital, the ED team identified non-urgent interruptions as an impediment to high quality care in the ED. The group observed and documented work processes and patient flow, as well as staffing structure, team interactions and task loads. They assessed requirements of both physicians and nurses, looking for ways to reassign or eliminate tasks. They found that providers were interrupted six to eight times per shift to take referral calls or critical values, and information about incoming patients wasn't centralized.

### Action

From this, Sturdy Memorial developed and implemented several new approaches, including assigning referral calls to the nursing staff and creating an electronic system that tied referral call information to the patient, so all ED staff could access details about incoming visits regardless of who took the referral call.

The ED team created printed notepads for less-emergent notifications so providers are not interrupted during patient visits. Nurses write notes on the pad regarding medication or reminders about tests and include the patient name and room number. They place the notes in a specified bin for each provider, who addresses the request when they are finished with their initial task. Before implementing the use of the notepads, nurses would either interrupt providers, or use scraps of paper and leave notes on keyboards, which would often get lost or overlooked.

The team also established a process where the nursing staff takes all critical values and assigns the lab discrepancy process to one person on one shift. This shift is double and triple covered allowing time for one person to manage the process, which often took days to complete prior.

### Keys to success

For Sturdy Memorial, the key to successfully identifying solutions to high-interruption tasks was involving the entire ED staff in the process from the beginning. Physicians and nurses worked collaboratively to assess the problem and developed workable solutions that made sense for everyone. Workload was carefully considered so staff could effectively take on new tasks with team support.

# “Quick Care” for non-emergent patients reduces wait times, improves patient experience in the ED

STURDY MEMORIAL HOSPITAL

For more than a century, Sturdy Memorial Hospital has served patients in and around Attleboro, expanding from 15 to 132 beds with a team of more than 1,500 employees. Some 7,000 patients are admitted annually and nearly 50,000 are treated in the 32-bed emergency department (ED).

## Challenge

As the hospital has grown, so too have demands for care. In the ED particularly, an increase in visits led to longer wait times. According to the Centers for Disease Control and Prevention, EDs across the country recorded 136.9 million visits in 2015. In only one-third of these visits, patients were seen in fewer than 15 minutes.

## Action

To address the challenges associated with increased volume, Sturdy Memorial brought together a multidisciplinary team to evaluate patient flow in the ED and develop quality improvement interventions. The group observed and documented work processes and patient flow, as well as staffing structure, team interactions and task loads. They quickly discovered that about one-quarter of all visits were low-acuity in nature and patients who could be seen quickly were being grouped with mid-acuity patients who needed more time with physicians.

Through a collaborative method, the staff implemented a fast track process to reduce wait times, improve the patient experience and enhance the delivery of care. They started by developing new triage guidelines and establishing Quick Care within the ED where low-acuity patients could be seen and treated.

With the new criteria, a nurse triages patients in the waiting area, documenting symptoms, medical history and vitals and begins any necessary treatments or testing, such as urinalysis or X-rays. Based on the guidelines, the triage nurse can separate non-emergent patients from the main ED to Quick Care, which reduces overall wait times, minimizes delays in patient care and improves patient satisfaction.

Conditions that are usually managed in Quick Care include sore throats, upper respiratory and ear infections, rashes, cuts and lacerations, sprains and strains and insect and tick bites. To streamline patient flow on an ongoing basis, Quick Care is open every day from 9 a.m. to 11 p.m., measurably the period with the heaviest patient volume.

## Outcomes

Sturdy Memorial has seen a dramatic improvement in patient flow and a reduction in ED wait times. Low-acuity patients are no longer forced to wait behind true emergency cases. Patients request to be seen in Quick Care, where more than 25 percent of visits are handled. With a targeted goal of a 90-minute turnaround time for patients, the length of stay for those in Quick Care averages one and a half versus three hours on the main ED side. The team reviews the triage guidelines every year, often expanding the requirements to allow more visits to be handled in Quick Care.

# Clinical guidelines help emergency departments provide best care possible

## UMASS MEMORIAL HEALTH CARE

UMass Memorial Health Care is the largest healthcare system in Central MA with three hospitals and over 1,000 beds. The emergency department (ED) at UMass Memorial has two campuses, University and Memorial, as well as a separate pediatric emergency department, and treats approximately 135,000 patients annually.

### Challenge

It is fairly well-established that written clinical practice guidelines can improve quality of care and reduce costs via standardization. Effective guidelines standardize care while still allowing for deviation and physician discretion when it is appropriate to do so. The challenge is to create guidelines that physicians will find easy to use and accessible.

### Action

At UMass Memorial Hospital, emergency department (ED) clinical guidelines have been in place for many years, but a formalized system for their development, implementation and ongoing surveillance began around 2010. In the current state, ED clinical guideline development is overseen by the ED System Quality and Patient Experience Committee. This committee is comprised of the physician clinical leads from each of the UMass hospitals. While some guidelines may be adopted directly from the American College of Emergency Physicians' clinical policies, UMass also has a process for developing internal guidelines. One individual on the committee will be charged with drafting the guidelines based on current research, and vetting it through the entire group of ED providers. The committee then decides to approve, not approve, or recommend edits. This simple structure allows for efficient delegation of responsibilities, easier global buy-in and a more streamlined approval process.

Although the creation and vetting of these guidelines is important, guidelines are only useful if they are easily accessible to providers at the point of care and are perceived as helpful. When the idea of clinical pathways was first presented, some UMass providers had concerns around providing "cookbook medicine." While those concerns have largely fallen away because deviation from them in appropriate cases is supported, the challenge remains to encourage providers to regularly refer to the guidelines rather than rely on memory.

### Keys to success

Recently, UMass Memorial ED residents addressed the challenge of guideline accessibility through a process improvement project. Instead of the previously used internal website, residents created a password-protected wiki page. The wiki page holds the ED's approximately guidelines as well as links to guidelines from other departments within the hospital. The wiki is accessible to physicians as well as advanced practice clinicians via links in the Epic electronic health records system, thereby facilitating access at the point of care. Updating the old website was often tedious and guidelines would have to be updated in multiple places. Updating guidelines and links on the wiki page is much easier. Furthermore, data collected internally shows that the wiki is being used more often than its predecessor.

In addition to a more use-friendly site, UMass Memorial regularly looks for ways to remind providers of the value of referring back to the guidelines. They have explored showing providers their individual data on compliance with specific guidelines. This is not meant to be punitive, but rather to establish a sense of accountability and transparency. Consistently safe clinical care is the goal of every provider, and simple, easily accessible guidelines make that goal more achievable.

# Scribe program allows for more direct provider-patient care

## UMASS MEMORIAL HEALTH CARE

UMass Memorial Health Care is the largest healthcare system in Central MA with three hospitals and over 1,000 beds. The emergency department (ED) at UMass Memorial has two campuses, University and Memorial, as well as a separate pediatric emergency department, and treats approximately 135,000 patients annually.

### Challenge

Documentation can take up a large amount of a physician's time and mental energy that could better be devoted to patient care. While admittedly an upfront investment of resources, scribes have been shown to save on costs related to physician documentation time while also increasing throughput and improving overall provider and patient satisfaction.<sup>12</sup>

### Action

In 2013, UMass Memorial implemented the use of medical scribes in the ED and was successful in making the case to hospital leadership that scribes would boost physician efficiency and documentation while also improving job satisfaction. Scribes in the UMass ED accompany the supervising provider to a patient's room and document the history and physical exam as well as medical decision making and interpretations of studies. This takes the onus of documentation off of the physician, who can devote more time to direct patient care. While some institutions have homegrown scribe programs, UMASS found it more convenient and beneficial to contract with ScribeAmerica, a company that recruits and trains individuals to be scribes.

### Outcomes

Since its implementation, the ED has found very few downsides to the scribe program other than perhaps high turnover in scribes, likely due to the nature of the position as a bridge to further healthcare related education. UMass ED physicians overwhelmingly find the scribes helpful. As Vice Chair of Emergency Medicine, Dr. Martin Reznick, puts it, "the vast majority [of physicians] find [scribes] very valuable and rewarding in that it allows them to do 'doc stuff' as opposed to documentation." An unexpected side benefit has been the teaching relationship between physicians and scribes. Many of the scribes aspire to be a nurse, physician's assistant, medic or physician and enjoy learning in the field. Physicians enjoy the opportunity to teach. Most importantly, the use of scribes has reduced the amount of work physicians are doing during or after their shifts and allows them to spend more time at the bedside. This "high touch care" helps build a relationship between physician and patient and improves patient satisfaction.

### What are medical scribes?

Medical scribes are non-clinical members of a care team who accompany clinicians during patient visits to document patient-clinician interactions and medical decision-making. In so doing, they enable clinicians to spend more time at the bedside.

<sup>1</sup> Heaton HA, Nestler DM, Barry WJ, et al. A time-driven activity-based costing analysis of emergency department scribes. Mayo Clin Proc Innov Qual Outcomes. 2019 Feb 26; 3(1): 30-34.

<sup>2</sup> Shuaib W, Hilmi J, Caballero J, et al. Impact of a scribe program on patient throughput, physician productivity, and patient satisfaction in a community-based emergency department. Health Informatics J. 2017 Mar 1.



## B. 2017 EMERGENCY MEDICINE WORKFORCE SURVEY

**TABLE 1: TOP RANKED PERCEIVED SAFETY RISKS IN THE EMERGENCY DEPARTMENT**

RANKING	MACEP (PHYSICIANS)	MAPA (PHYSICIAN ASSISTANTS)	MENA (NURSES)
1	Delayed or missed care in the ED	Delayed or missed care in the ED	Violence or abuse against staff
2	Patient left without being seen	Diagnostic error (missed/delayed/incorrect diagnoses)	Delayed or missed care in the ED
3	Violence or abuse against staff	Patient left without being seen	Patient left without being seen
4	Diagnostic error (missed/delayed/incorrect diagnoses)	Discharge of patient without adequate instructions or plan for follow-up treatment	Falls with injury
5	Medication errors	Healthcare-associated infections	Inadequate pain management
6	Discharge of patient without adequate instructions or plan for follow-up treatment	Violence or abuse against staff	Medication errors
7	Falls with injury	Medication errors	Discharge of patient without adequate instructions or plan for follow-up treatment
8	Inadequate pain management	Inadequate pain management	Diagnostic error (missed/delayed/incorrect diagnoses)
9	Healthcare-associated infections	Falls with injury	Patient self-harm events
10	Patient self-harm events	Patient not notified of critical lab results post-discharge	Healthcare-associated infections

**TABLE 2: TOP 10 PERCEIVED CONTRIBUTORS TO ADVERSE EVENTS IN THE EMERGENCY DEPARTMENT**

RANKING	MACEP (PHYSICIANS)	MAPA (PHYSICIAN ASSISTANTS)	MENA (NURSES)
1	Inefficient ED processes and workflows	Inefficient ED processes and workflows	Inefficient ED processes and workflows
2	Difficulties related to electronic health records	Lack of available medical history, including current medications	Staff turnover
3	Inadequate communication/hands-off btw. ED staff and other depts./external providers	Staff turnover	Inadequate communication/hands-off btw. ED staff and other depts./external providers
4	Staff turnover	Under-triage	Inadequate communication or hands-off among staff
5	Lack of available in-house or on-call specialists	Inadequate communication or hands-off among staff	Insufficient orientation of new clinical staff
6	Lack of available medical history, including current medications	Inadequate communication/hands-off btw. ED staff and other depts./external providers	Staff reluctance to speak up about safety observations or concerns
7	Inadequate communication or hands-off among staff	Inadequate teamwork among staff	Lack of available medical history, including current medications
8	Inadequate teamwork among staff	Insufficient overnight staff by attending physicians	Sign off processes that delay discharge
9	Under-triage	Lack of available in-house or on-call specialists	Inadequate teamwork among staff
10	Lack of available diagnostic support (ultrasound, MRI, other imaging)	Sign off processes that delay discharge	Under-triage

## C. PENNSYLVANIA PATIENT SAFETY AUTHORITY DATA

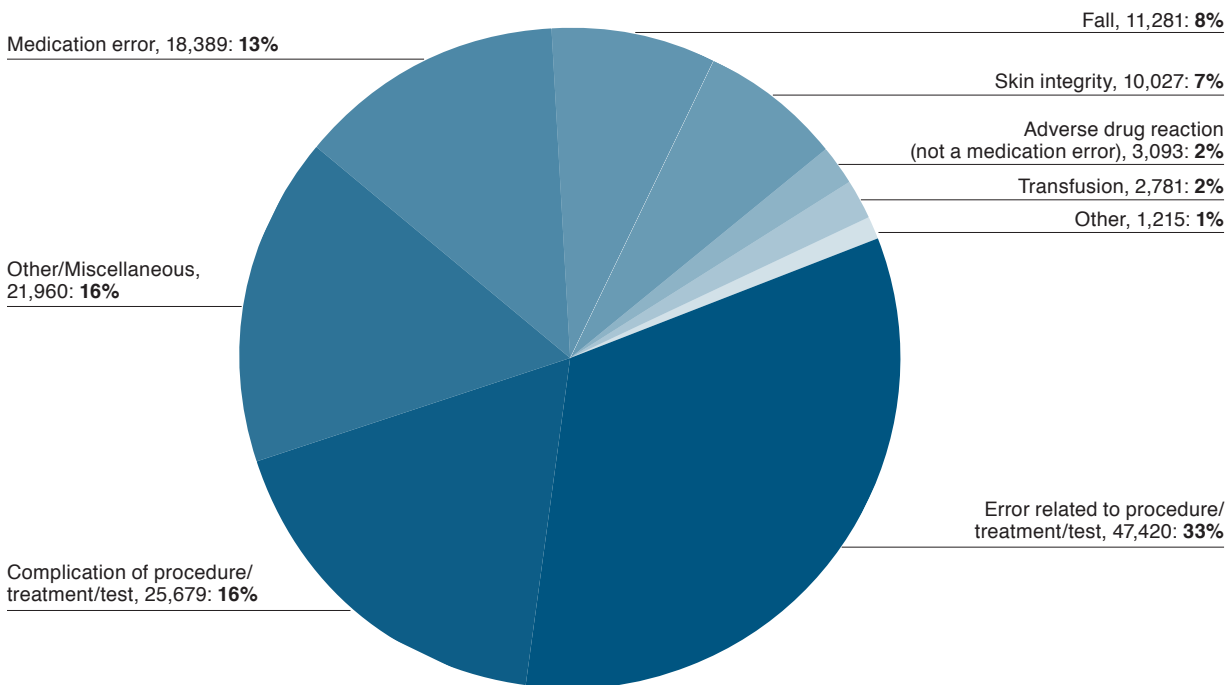
The Betsy Lehman Center turned to its counterpart in Pennsylvania to access more robust patient safety incident datasets. The Pennsylvania Safety Authority (PSA) receives close to 300,000 reports of safety incidents and near misses in Pennsylvania hospitals and ambulatory surgery centers each year. We believe that Pennsylvania's health care system is similar enough to Massachusetts to make its data useful to our understanding of likely systemic patient safety risks here.

### LONGITUDINAL ANALYSIS

The PSA agreed, at the Center's request, to review their ED-related event reports for a 5-year period, from 2011 to 2016. The following is not broken down by component, but by adverse event type. Errors related to a procedure, treatment, or a test make up the majority of the over 140,000 events submitted to the PSA. This type includes errors like wrong side procedures, tests being ordered and not performed, or a delay in service.

### FREQUENCY OF EVENT TYPES IN THE EMERGENCY DEPARTMENTS

Submitted to the Pennsylvania Safety Authority, 2011-2016 (N=141,890)



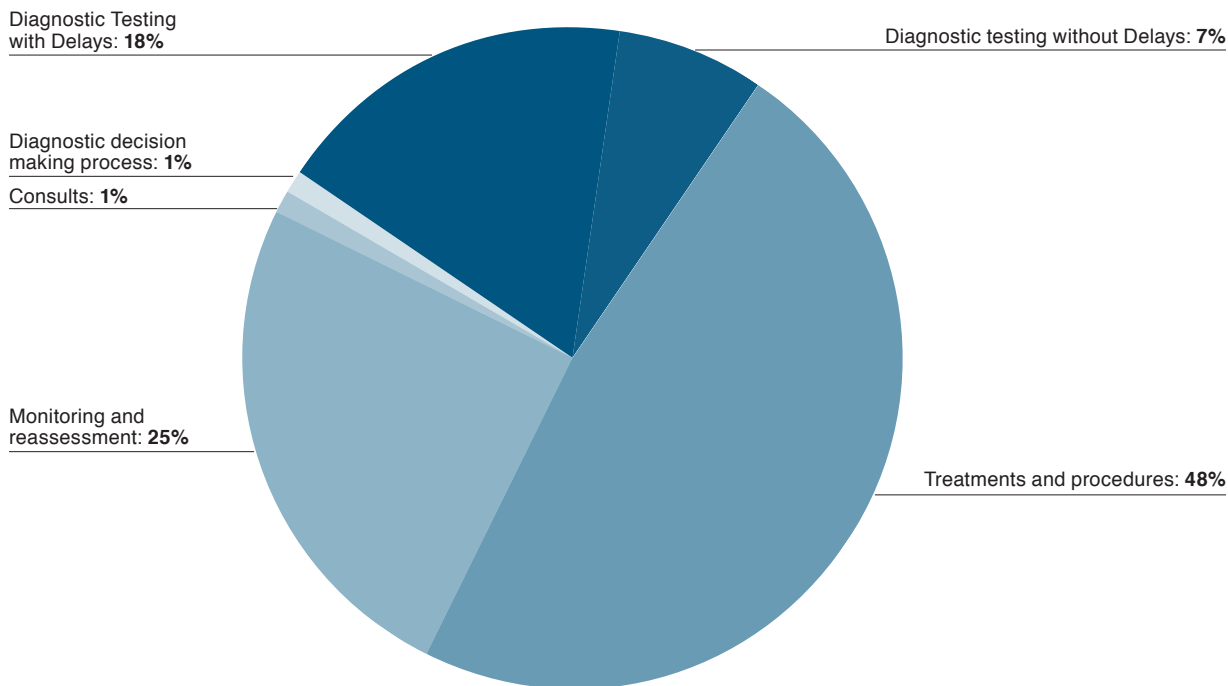
## PSA EMERGENCY DEPARTMENT (ED) REPORTS

In 2013, the PSA issued a series of reports analyzing that year's incident data from Pennsylvania hospital EDs, applying a three-phase framework that they had previously established in 2010. Each phase covers a time period of the ED visit:

<b>PHASE I</b> Patient Arrival in the emergency department (ED) to Diagnostic Evaluation	<b>PHASE II</b> Diagnostic Evaluation through Disposition Decision	<b>PHASE III</b> Disposition Decision to Departure from the ED
Includes: <ul style="list-style-type: none"> <li>• Patient arrival in the ED</li> <li>• Patient triage</li> <li>• Placement in the treatment area</li> <li>• Practitioner arrival/initial assessment</li> <li>• Practitioner arrival/initial assessment</li> </ul>	Includes: <ul style="list-style-type: none"> <li>• Treatments and procedures</li> <li>• Diagnostic testing</li> <li>• Monitoring and reassessment (including continued physician and nursing assessments)</li> <li>• Consults</li> <li>• Diagnosing (including medical decision making)</li> <li>• Disposition decision</li> </ul>	Includes: <ul style="list-style-type: none"> <li>• Monitoring patient until bed or unit is available or until the patient is discharged</li> <li>• Communication or handoff to next facility, unit, or care setting</li> <li>• Patient teaching and discharge</li> <li>• Transportation or transfer</li> </ul>
Patient safety hazards: <ul style="list-style-type: none"> <li>• Patients who leave without triage</li> <li>• Unmonitored patients in the waiting area</li> <li>• Rushed or inaccurate triage process</li> <li>• Patients who leave without being seen</li> <li>• Unmonitored patients in rooms</li> <li>• Rushed, incomplete, or inaccurate patient assessments</li> </ul>	Patient safety hazards: <ul style="list-style-type: none"> <li>• Patients who leave without being seen, leave without treatment, or leave against medical advice</li> <li>• Unmonitored patients in the treatment room</li> <li>• Errors in ordering, executing, and resulting</li> <li>• Rushed, incomplete, or inaccurate patient assessment</li> <li>• Diagnostic decision errors of failure to diagnose</li> </ul>	Patient safety hazards: <ul style="list-style-type: none"> <li>• Gaps in treatment responsibilities and oversight</li> <li>• Unmonitored patients</li> <li>• Unmonitored boarders in the ED</li> <li>• Rushed, incomplete, or inaccurate patient assessment</li> <li>• Poor communication and handoffs</li> <li>• Incomplete patient and family education</li> <li>• Transportation or transfer difficulties</li> </ul>

## PERCENTAGE OF EMERGENCY DEPARTMENT FLOW PHASE II EVENT REPORTS, BY COMPONENT

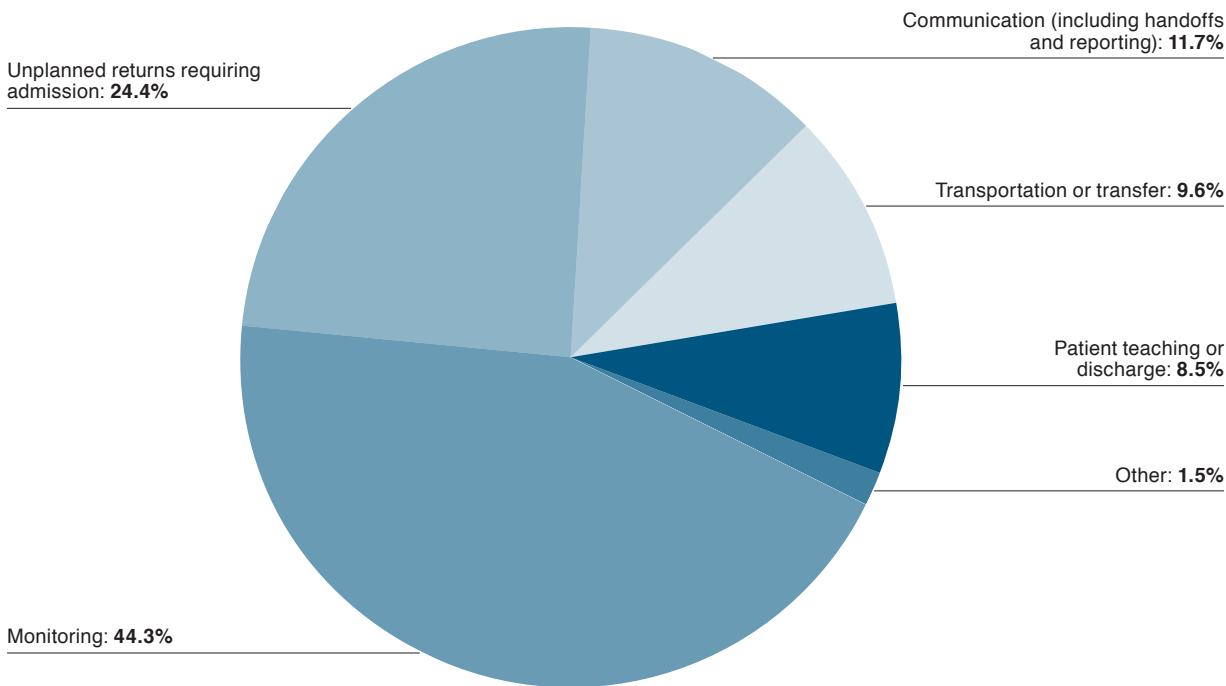
Submitted to the Pennsylvania Safety Authority in calendar year 2013 (N=2,495)



ED Phase II Incident Component	Example
Treatments and procedures	The tech reported that the patient weighed 22 kg, which was [used to administer a weight-based medication]. Before giving the next medication, [staff] realized the patient weighed 22 pounds not kg. The [electronic medical record] was corrected, and there were no adverse reactions.
Diagnostic testing with delays	A patient had an EKG [electrocardiogram] performed, which was read by the resident. The EKG was misplaced. It was not until the final reading of the EKG, which was available electronically [about two days] later, that it was discovered that the EKG was [abnormal].
Diagnostic testing without delays	Respiratory therapist drew an ABG [arterial blood gas], which resulted in a large hematoma formation.
Consults	A [cardiac arrest alert] was called. Calls were placed to two different cardiologists who stated they were not on call. This resulted in a 12-minute delay in getting the patient to the catheter lab.
Diagnostic decision making process	A patient was diagnosed with hypertension and Bell palsy. Patient returned with no control of right arm, and CT scan [showed] an infarct in left frontal parietal region.

## PERCENTAGE OF EMERGENCY DEPARTMENT FLOW PHASE III EVENT REPORTS, BY COMPONENT

Submitted to the Pennsylvania Safety Authority in calendar year 2013 (N=540)



ED Phase III Incident Component	Example
Monitoring	Patient was sitting up in the chair awaiting transport back to nursing home. RN [registered nurse] near the room heard a thump and found the patient lying against the wall complaining of left arm pain.
Unplanned returns requiring admission	A [pediatric] patient was seen in the ED for nausea and vomiting and decreased urine output. The patient was discharged with a [gastrointestinal infection] diagnosis and given a prescription. The parents brought the patient back with worsening symptoms, and [the patient] was admitted.
Communication (including handoffs and reporting)	There was a delay in transferring the patient to the inpatient unit. There was confusion about the admission orders, and poor communication led to a delay in medication administration. The medication was administered once the error was discovered.
Transportation or transfer	The patient was admitted with a [respiratory diagnosis] and was transported to CAT scan and ultrasound prior to being transported to the unit. The patient was to be on oxygen continuously but was transported without it. On arrival to the floor, [the patient's] oxygen saturation was in the 70s, [his] heart rate was tachycardic, and [he] was complaining of chest [tightness]. Oxygen was immediately applied and [he] received an EKG [electrocardiogram], lab work, and breathing treatment. [He] responded to treatment within a half hour.
Patient teaching or discharge	The patient was instructed [on the use of] crutches prior to disposition. The patient attempted to walk with crutches and fell and is [now] unable to bear weight on foot.
Other	Events that did not meet the criteria of the above classifications.

## REFERENCES

1. Smith M and Feied C. The Emergency Department as a Complex System. *New Engl Complex Syst Inst* (2006). Available at: <https://necsi.edu/the-emergency-department-as-a-complex-system>. Accessed July 30, 2019.
2. Rui P, Kang K, Ashman JJ. National Hospital Ambulatory Medical Care Survey: 2016 emergency department summary tables. 2016. Available: [https://www.cdc.gov/nchs/data/ahcd/nhamcs\\_emergency/2016\\_ed\\_web\\_tables.pdf](https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2016_ed_web_tables.pdf). Accessed July 30, 2019.
3. Table 74; Emergency department visits within the past 12 months among adults aged 18 and over, by selected characteristics: United States, selected years 1997–2014. In: National Center for Health Statistics, Health United States, 2015. Hyattsville, MD, 2016. Available: [https://www.cdc.gov/nchs/data/ahcd/nhamcs\\_emergency/2016\\_ed\\_web\\_tables.pdf#074](https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2016_ed_web_tables.pdf#074). Accessed July 30, 2019.
4. Health Policy Commission, 2017 Cost Trends Report Chart Pack. Available: <https://www.mass.gov/files/documents/2018/03/28/2017%20CTR%20Chartpack.pdf>. Accessed July 29, 2019.
5. Dawson H, Weerasooriya J, Webster G. Hospital admissions via the emergency department: Implications for planning and patient flow. *Healthc Q*. 2008;11:20–2.
6. While all medical professionals experience interruptions, it has been demonstrated that ED physicians are more likely to experience interruption. According to an observational study by Chisolm, et al, ED physicians were interrupted an average of 9.7 times per hour compared to 3.9 times per hour among primary care physicians. See, Chisolm CD, Dornfeld, AM, Nelson DR, Cordell WH. Work interrupted: A comparison of workplace interruptions in emergency departments and primary care offices. *Ann Emerg Med* August 2001;38:146-151.
7. The 2016 Model of the Clinical Practice of Emergency Medicine calls for emergency physicians to “prioritize and implement the evaluation and management of multiple patients in the emergency department, including handling interruptions and task switching, in order to provide optimal care.” See Counselman FL, et al. *Journ. Of Emer. Med.* June 2017; 52(6): 846-849.
8. Smith-Coggins R, Broderick KB, Marco CA. Night shifts in emergency medicine: the American board of emergency medicine longitudinal study of emergency physicians. *J Emerg Med*. 2014 Sep; 47(3):372-8.
9. Lockley, SW, Barger LK, Ayas NT, et al. Effects of health care provider work hours and sleep deprivation on safety and performance. *Jt Comm J Qual Patient Saf*. 2007 Nov; 33(11) Supp.
10. Peckham C. Medscape Lifestyle Report of 2017: Race and Ethnicity, Bias and Burnout, January 11, 2017.
11. Hooper C, Craig J, Janvrin DR, et al. Compassion satisfaction, burnout, and compassion fatigue among emergency nurses compared with nurses in other selected inpatient specialties. *J Emerg Nurs* 2010 Sep; 36(5): 420-7.
12. Stang AS, Wingert AS, Hartling L, and Plint AC. Adverse events related to emergency department care: a systematic review. *PLoS One* 8(9): e74214.
13. Id at 4.
14. Id.
15. Id.
16. Bobrovitz N, Lasserson DS, Briggs AD. Who breaches the four-hour emergency department wait time target? A retrospective analysis of 374,000 emergency department attendances between 2008 and 2013 at a type 1 emergency department in England. *BMC Emerg Med* 2017 Dec;17(1):32.
17. Wargon M, Casalino E, Guidet B. From model to forecasting: a multicenter study in emergency departments. *Acad Emerg Med* 2010 Sep 1;17(9):970-978.
18. The workforce survey was sent via electronic mail to 885 MACEP members, 337 MAPA members and 898 MENA members. The response rates for each, respectively, were 10 percent, 14 percent and 10 percent.
19. American College of Emergency Physicians. Definition of Boarded Patient, Revised September 2018. Available at: <https://www.acep.org/patient-care/policy-statements/definition-of-boarded-patient>. Accessed July 11, 2019.
20. Massachusetts Department of Public Health. Serious Reportable Events (SREs) website. Available at: <https://www.mass.gov/lists/serious-reportable-event-sres>. Accessed July 22, 2019.
21. American College of Emergency Physicians, Crowding Policy Statement, Approved April 2019. Available: <https://www.acep.org/globalassets/new-pdfs/policy-statements/crowding.pdf>. Accessed July 11, 2019.
22. Litvak E, McManus ML, Cooper A. Root cause analysis of emergency department crowding and ambulance diversion in Massachusetts. A report submitted by the Boston University Program for the management of Variability in Health Care Delivery under a grant from the Massachusetts Department of Public Health, 2002.
23. Id.
24. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. *Ann Emerg Med* 2008; 52:126-136.
25. Singer AJ, Thode HC Jr, Viccellio P, et al. The association between length of emergency department boarding and mortality, *Acad Emerg Med* 2011; 18(12): 1324-9.
26. Liew D, Liew D, Kennedy MP. Emergency department length of stay independently predicts excess inpatient length of stay. *Med J Aust* 2003; 177(9): 492-5.
27. Epstein SK, Huckins DS, Liu SW, et al. Emergency department crowding and risk of preventable medical errors. *Intern Emerg Med* 2012 Apr; 7(2): 173-80.
28. Bauchwitz B, Lynn S, Weyhrauch P, et al. Thematic issues in analysis and visualization of emergency department patient flow. Proceedings of the 2018 International Symposium on Human Factors and Ergonomics in Health Care. 132-139.

29. Baker DW, Stevens CD, Brook RH. Patients who leave a public hospital emergency department without being seen by a physician. Causes and consequences. *JAMA*. 1991;266:1085-1090.
30. Forero R, Hillman K. Access Block and Overcrowding: A Literature Review. The Simpson Centre-UNSW (prepared for ACEM) 2008:79.
31. Pham JC, Story JL, Hicks RW, et al. National study on the frequency, types, causes, and consequences of voluntarily reported emergency department medication errors. *Journ Emerg Med* 2011 May;40(5):485-492.
32. American College of Emergency Physicians. Fact Sheet on Emergency Department Violence. <http://newsroom.acep.org/2009-01-04-emergency-department-violence-fact-sheet>. Accessed July 20, 2019.
33. Asha SE, Chan ACF, Walter E, et al. Impact from point-of-care devices on emergency department patient processing times compared with central laboratory testing of blood samples: a randomised controlled trial and cost-effectiveness analysis *Emerg Med J* 2014;31:714-719.
34. Bish PA, McCormick MA, Otegbeye M. Ready-JET-go: split flow accelerates ED throughput. *J Emerg Nurs*. 2016;42(2):114-119.
35. Arya R, Wei G, McCoy JV, et al. Decreasing length of stay in the emergency department with a split emergency severity index 3 patient flow model. *Acad Emerg Med*. 2013;20(11):1171-1179.
36. Oredsson S, Jonsson H, Rognes J, et al. A systematic review of triage-related interventions to improve patient flow in emergency departments. *Scand J Trauma J Resusc Emerg Med*. 2011;19:43.
37. Wallingford G, Joshi N, Callagy P, et al. Introduction of a horizontal and vertical split flow model of emergency department patients as a response to overcrowding. *J Emerg Nurs* 2018 Jul; 44(4):345-352.
38. Murphy SO, Barth BE, Carlton EF, et al. Does an ED flow coordinator improve patient throughput? *J Emerg Nurs*, 2014.
39. Viccellio A, Santora C, Singer AJ, Thode HC, Henry MC. The association between transfer of emergency department boarders to inpatient hallways and mortality: a 4-year experience. *Ann Emerg Med* 2009; 54: 487-91.
40. Shepperd S, Doll H, Angus, RM, et al. Avoiding hospital admission through provision of hospital care at home: a systematic review and meta-analysis of individual patient data. *CMAJ* 2009 Jan 20; 180(2): 175-182.
41. Tadros AS, Castillo EM, Chan TC, et al. Effects of an emergency medical services-based resource access program on frequent users of health services. *Prehosp Emerg Care*. 2012;16(4):541-7.
42. While all medical professionals experience interruptions, it has been demonstrated that ED physicians are more likely to experience interruption. According to an observational study by Chisolm, et al, ED physicians were interrupted an average of 9.7 times per hour compared to 3.9 times per hour among primary care physicians. See, Chisolm CD, Dornfeld, AM, Nelson DR, Cordell WH. Work interrupted: A comparison of workplace interruptions in emergency departments and primary care offices. *Ann Emerg Med* August 2001;38:146-151.
43. The 2016 Model of the Clinical Practice of Emergency Medicine calls for emergency physicians to “prioritize and implement the evaluation and management of multiple patients in the emergency department, including handling interruptions and task switching, in order to provide optimal care.” See Counselman FL, et al. *Journ. Emer. Med*. June 2017; 52(6): 846-849.
44. Van Merriënboer, Joroen JG, Sweller J. Cognitive load theory in health professional education: design principles and strategies. *Med Educ*. 2009 Dec; 44:85-93.
45. Miller D. My brain hurts: applying cognitive load theory to emergency medicine handoffs. NUEM Blog, 2017 Oct. Available: <http://www.nuemblog.com/blog/cognitive-load>. Accessed May 29, 2019.
46. Id.
47. Weigl M, Muller A, Holland S, et al. Work conditions, mental workload and patient care quality: a multisource study in the emergency department. *BMJ Qual Saf* 2015; 0:1-10.
48. Westbrook JI, Raban MZ, Walter SR, et al. Task errors by emergency physicians are associated with interruptions, multitasking, fatigue and working memory capacity: a prospective, direct observation study. *BMJ Qual Saf* 2018;27:655-663.
49. Coreia E. When conversation is better than computation. *J Am Med Inform Assoc* 2000; 7:277-86.
50. Westbrook JI, Raban MZ, Walter SR, et al. Task errors by emergency physicians are associated with interruptions, multitasking, fatigue and working memory capacity: a prospective, direct observation study. *BMJ Qual Saf* 2018;27:655-663.
51. Flynn, F, Evanish JQ, Fernald JM, et al. Progressive care nurses improving patient safety by limiting interruptions during medication administration. *Crit Care Nurs* (2016): 36(4).
52. Singer JI, Dean J. Emergency physician intershift handovers: an analysis of our transitional care. *Pediatr Emerg Care*. 2006;22: 751-754.
53. Yoo J, Jung KY, Kim T, et al. A Real-Time Autonomous Dashboard for the Emergency Department: 5-Year Case Study. *JMIR mHealth uHealth* 2018;6(11).
54. Przybylo JA, Wang A, Loftus P, Evans KH, Chu I, Shieh L. Smarter hospital communication: secure smartphone text messaging improves provider satisfaction and perception of efficacy, workflow. *J Hosp Med* 2014; 9 (09) 573-578.
55. Heaton HA, Nestler DM, Barry WJ, et al. A time-driven activity-based costing analysis of emergency department scribes. *Mayo Clin Proc Inn Qual Out* 2019;3(1): 30-34.
56. Roman C, Edwards G, Dooley M, et al. Roles of the emergency medicine pharmacist: a systematic review. *Am J Health-Syst Pharm* 2018 Jun;75(11): 796-806.
57. Brown JN, Barnes CL, Beasley B. Effect of pharmacists on medication errors in an emergency department. *Am J Health-Syst Pharm* 2008;65: 330-333.



58. Patel S, Mathis AS, Costello J, et al. Satisfaction with medication reconciliation completed by pharmacy technicians in an emergency department. *P&T* 2018; 43(7):423-428.
59. Markovic M, Mathis AS, Ghin HL, et al. A comparison of medication histories obtained by a pharmacy technician versus nurses in the emergency department. *P&T* 2017; 41(1): 41-46.
60. Silvestri S, Sun J, Ralls G and Papa L. An emergency department paramedic staffing model significantly improves EMS transport unit offload time – a novel approach to an ED crowding challenge. *Emerg Med* 2014; 4(6):1-6.
61. Panella M, Marchisio S, Di Stanislao F. Reducing clinical variations with clinical pathways: do pathways work? *Int J Qual Health Care* 2003; 15(6): 509-521.
62. Bekmezian A, Fee C, Weber E. Clinical pathway improves pediatrics asthma management in the emergency department and reduces admissions. *J Asthma* 2015; 52(8): 806-814.
63. Redfern E, Hoskins R, Gray J, et al. Emergency department checklist: an innovation to improve safety in emergency care. *BMJ Open Quality* 2018; 7(3).
64. Smith KA, High K, Collins SP, et al. A preprocedural checklist improves the safety of emergency department intubation of trauma patients. *Society of Academic Emergency Medicine* 2015. Available: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/acem.12717>. Accessed July 30, 2019.
65. Hill, R. G., L. M. Sears, and S. W. Melanson. 4000 Clicks: A Productivity Analysis of Electronic Medical Records in a Community Hospital ED. *Am J Emerg Med* 31, no. 11 (2013): 1591–94.
66. Neri, P., L. Redden, S. Poole, et al. "Emergency Medicine Resident Physicians' Perceptions of Electronic Documentation and Workflow." *Appl Clin Inform* 6, no. 1 (2015): 27–41.
67. Green LA, Nease D Jr., Klinkman MS. Clinical reminders designed and implemented using cognitive and organizational science principles decrease reminder fatigue. *J Am Board Fam Med*. 2015 May-Jun; 28(3):351-9.
68. Morey JC, Simon R, Jay GD, et al. Error reduction and performance improvement in the emergency department through formal teamwork training: Evaluation results of the MedTeams project. *Health Serv Res*. 2002 Dec; 37(6): 1553-1581.
69. Martin HA, Ciurzynski SM. Situation, background, assessment, and recommendation – guided huddles improve communication and teamwork in the emergency department. *Journ Emerg Nurs* 2015 Nov; 41(6): 484-8.
70. Vashi A, Rhodes KV. "Sign Right Here and You're Good to Go": a content analysis of audiotaped emergency department discharge instructions. *Ann Emerg Med*. 2011;57:315–322.
71. Boonyasai RT, Ijagbemi OM, Pham JC, et al. Improving the emergency department discharge process: environmental scan report. Agency for Healthcare Research and Quality (2014).
72. Darragh PJ, Bodley T, Orchanian-Cheff A, et al. A systematic review of interventions to follow-up test results. *Journ Gen Int Med* 2018 May33(5): 750-758.
73. Murray KA, Belanger A, Devine LT, et al. Emergency department discharge prescription errors in an academic medical center. *Proc (Bayl Univ Med Cent)*. 2017 Apr; 30(2): 143-146.
74. Horwitz LI, Moriarty JP, Chen C, et al. Quality of discharge practices and patient understanding at an academic medical center. *JAMA Intern Med* 2013;173(18):1715-22. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3836871>. Accessed June 16, 2019.
75. Samuels-Kalow ME, Stack AM, Porter SC. Effective discharge communication in the emergency department. *Ann Emerg Med* 2012 Aug; 60(2): 152-159.
76. Marcoux V, et al. Screening tools to identify patients with complex health needs at risk of high use of health care services: A scoping review. 2017 *PLoS ONE* 12(11): e0188663.
77. See, for example, Salvi F., et al. Risk stratification of older patients in the emergency department: comparison between the identification of seniors at risk and triage risk screening tool. *Rejuven Res*. 2012 Jun; 15(3):288-94, for a comparison of tools that may be used to risk-stratify elderly patients in the emergency department.
78. Karam G, Radden Z, Berall LE, et al. Efficacy of emergency department-based interventions designed to reduce repeat visits and other adverse outcomes for older patients after discharge: a systematic review. *Geriatr Gerontol Int* 2015; 15: 1107-1117.
79. Jones J, Clark W, Bradford J, et al. Efficacy of a telephone follow-up system in the emergency department. *J Emerg Med* 1988;6(3):249-54.
80. Poncia HD, Ryan J, Carver M. Next day telephone follow up of the elderly: a needs assessment and critical incident monitoring tool for the accident and emergency department. *J Accid Emerg Med* 2000;17(5):337-40.
81. Nejtek VA, Aryal S, Talari D, et al. A pilot mobile integrated healthcare program for frequent utilizers of emergency department services. *Am Jour Emerg Med*. 2017 35:1702-1705.
82. Darragh PJ, Bodley T, Orchanian-Cheff A, et al. A systematic review of interventions to follow-up test results pending at discharge. *J Gen Intern Med*. 2018 May; 33(5): 750-758.